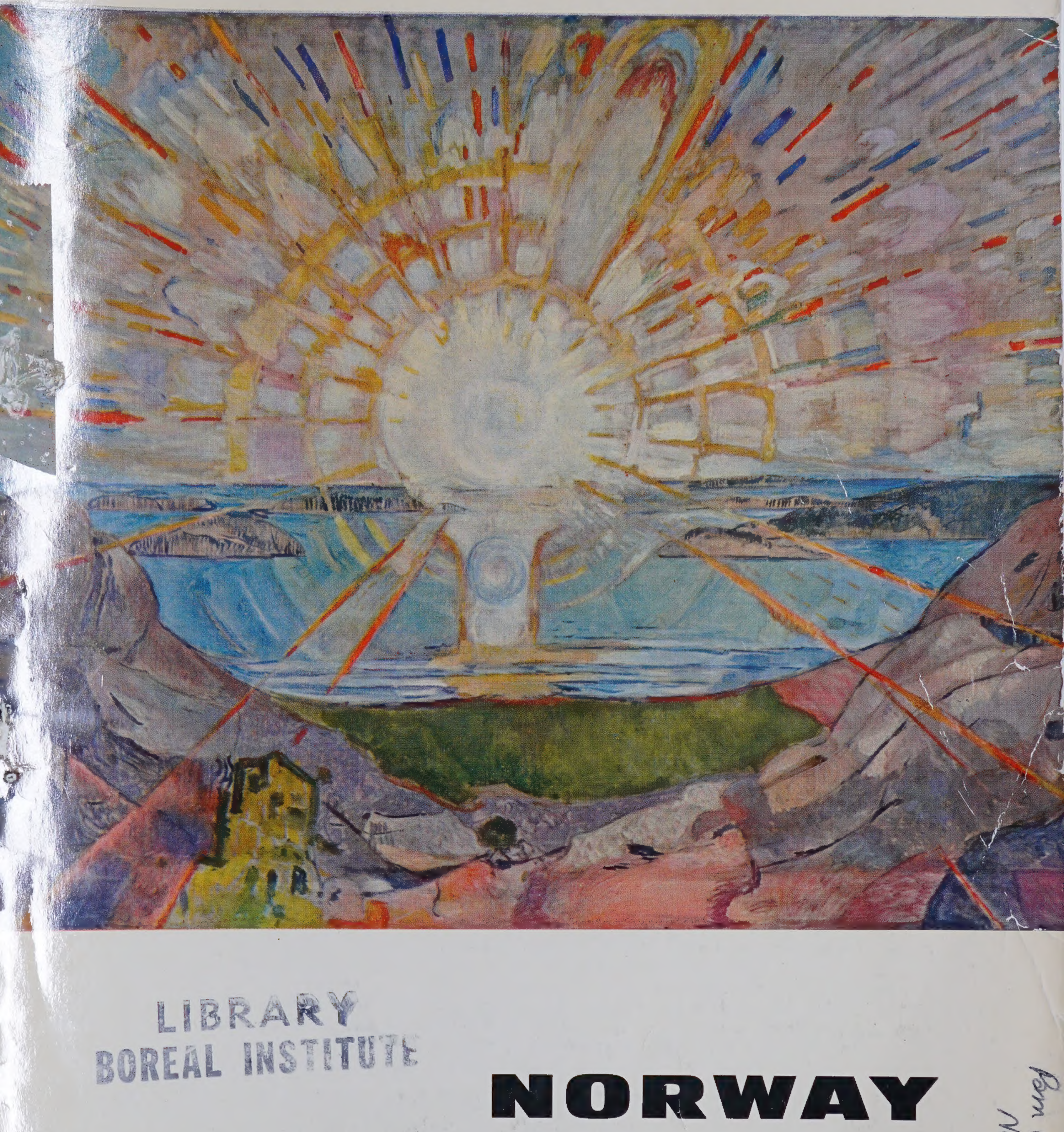
REC'D AUG 13 1964



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Pam (*58)
Norway.

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POLAR
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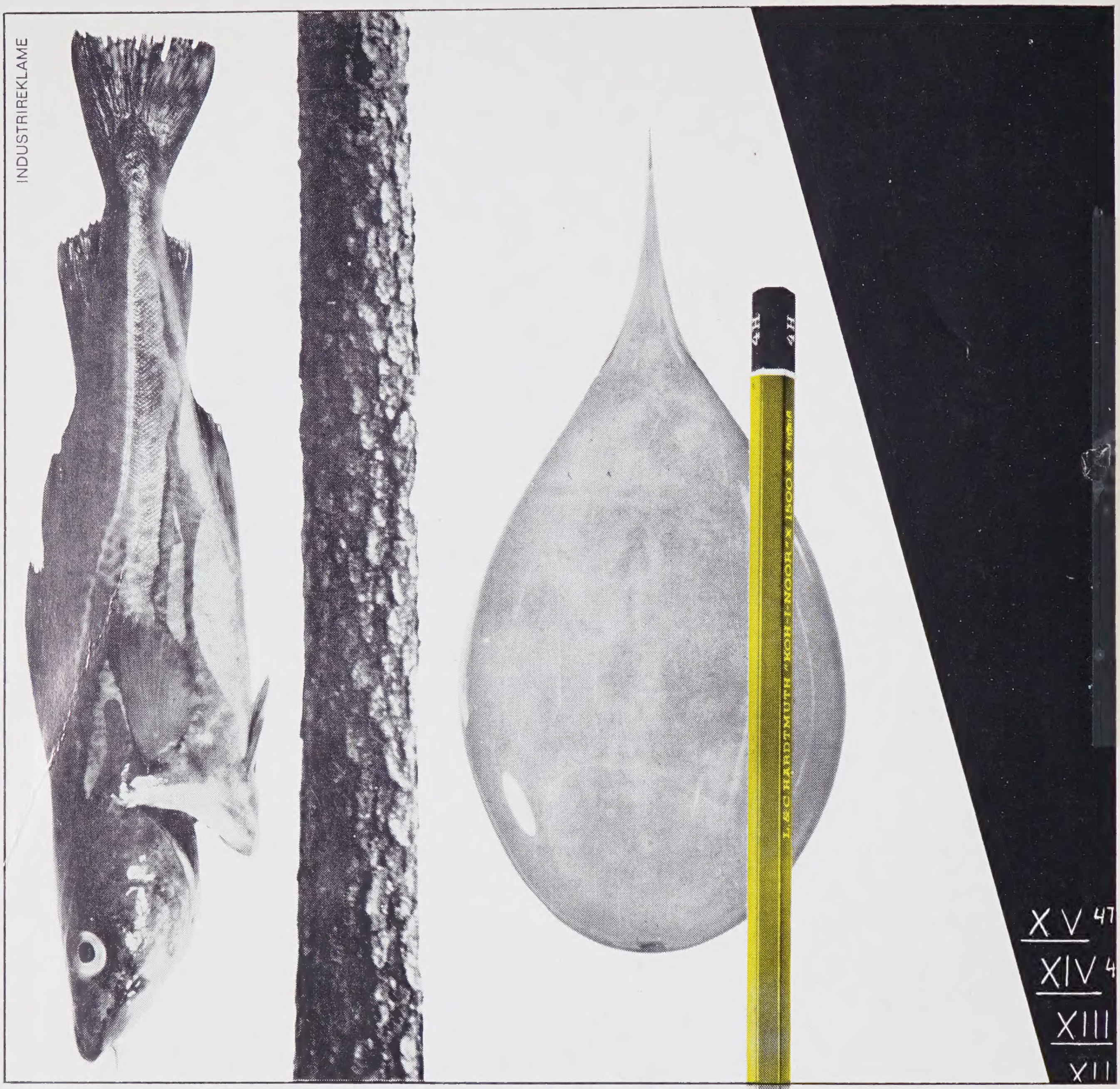
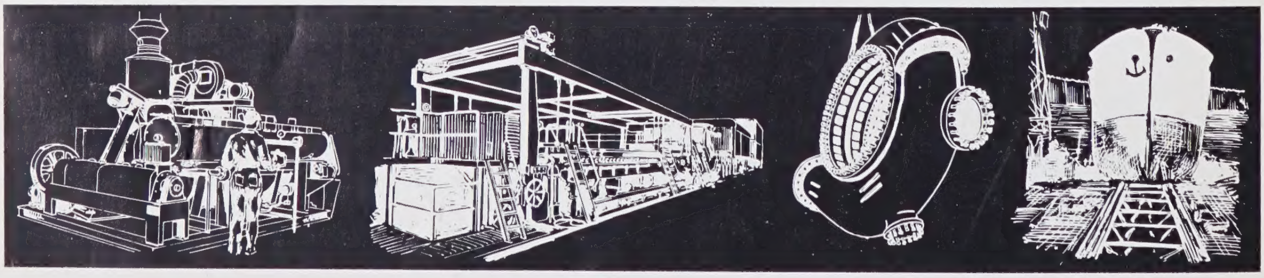


THE KVÆRNER GROUP consists of four major mechanical engineering companies and their subsidiaries with tradition dating back to the early days of the Norwegian industry. Norway's industrial development is mainly based on the country's natural resources. Consequently, machinery for the pulp and paper industries, sawmills and the fish processing industries as well as machinery for the water power development occupy a central place in the companies' manufacturing program. The Group is also engaged in the shipbuilding and production of marine engineering equipment. More than 250 engineers are engaged exclusively in the work of design and research, ready and able at all times to tackle the technical problems of the day.
Enquiries addressed to **Kværner Brug Sekretariat,** P.O. Box 225, Oslo — Norway.



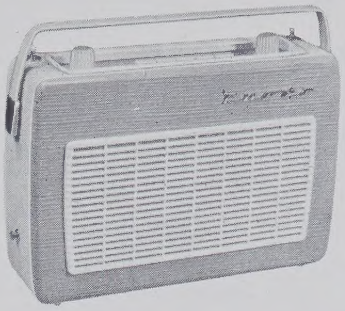
A.S KVÆRNER BRUG - A.S MYRENS VERKSTED - A.S THUNES MEK. VÆRKSTED - A.S MOSS VÆRFT & DOKK
KVÆRNER BRUGS KJØLEAVDELING A.S - A.S SØRUMSAND VERKSTED - A.S BENTSE STØPERI - A.S MESNA BRUK - A.S THUNE-MASKINER

REC'D AUG 13 1964

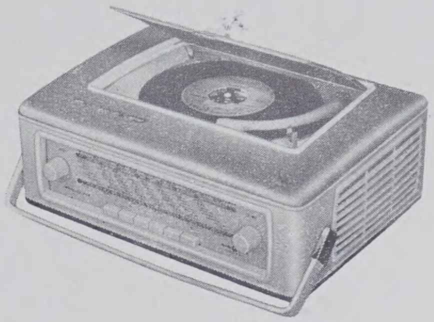
Pam (*58)

RADIOS FOR MODERN HOMES

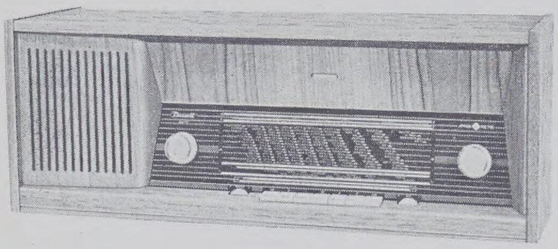
RADIONETTE was founded in 1927 and has retained its position as the leading Norwegian radio and TV manufacturer since then.
In Norway, a country of high mountains and deep valleys, reception conditions make it necessary for radios to have a standard of performance which is more than usually high. Common to all RADIONETTE models is that they are real masterpieces of technique built to 35 years' experience and research.



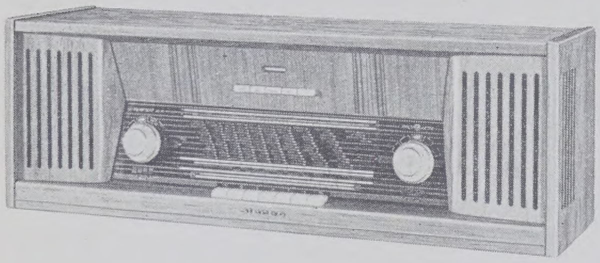
KURER AUTO FM
An AM/FM portable and car radio. Long-, medium- and FM wave bands. Printed circuits. 9 transistors, 4 diodes. Push-button system. Battery operated. Built-in antennas. Easy car mounting.



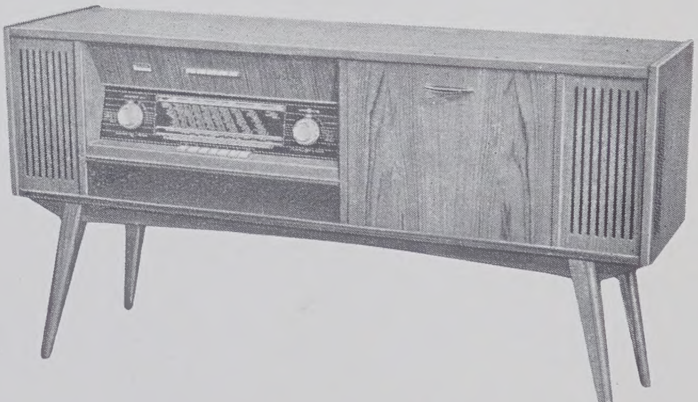
COMBI 2-SPEED A new combination AM receiver and 2-speed record player. Long-, medium- and short wave bands. 33 and 45 r.p.m. Printed circuits. Built-in antennas. 7 transistors, 2 diodes. Battery operated. Powerful loudspeaker with tone range from 70—16,000 c/s. Smart design. **COMBI 2-speed with FM** (87.5—108 Mc/s) model is available.



DUETT HI-FI SECTION INTERCOM. SYSTEM
A smartly designed cabinet to fit into modern bookshelf sections. Intercommunication system. Long-, medium-, 2 short and FM wave bands. Push-button system. Duplex tuning. Built-in magnetic antenna. 6 tubes. Separate bass and treble control. AC/mains operated.



QUINTETT HI-FI STEREO SECTION
A handsomely designed table model which will match with any interior. The placing of 2 dual cone speakers in each end of the cabinet gives an excellent STEREO reproduction. Long-, medium-, 2 short and FM wave bands. Tone selector keyboard. 8 tubes. AC/mains operated.



QUINTETT HI-FI STEREO PHONOGRAPH
Stereophonic sound reproduction is three-dimensional. 2 Hi-Fi dual cone speakers will assure an excellent reproduction for stereophonic sound. Tone selector keyboard. Long-, medium-, 2 short and FM wave bands. 8 tubes. Duplex tuning. A modern style cabinet with sliding shelf for tape recorder or record changer.

Our high quality production line contains 30 different models of portables, table- and consols, televisions, tape-recorders and amplifiers.

Export to 60 countries.

RADIONETTE

TRONDHEIMSVEIEN 100
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From ocean bed to mountain peak

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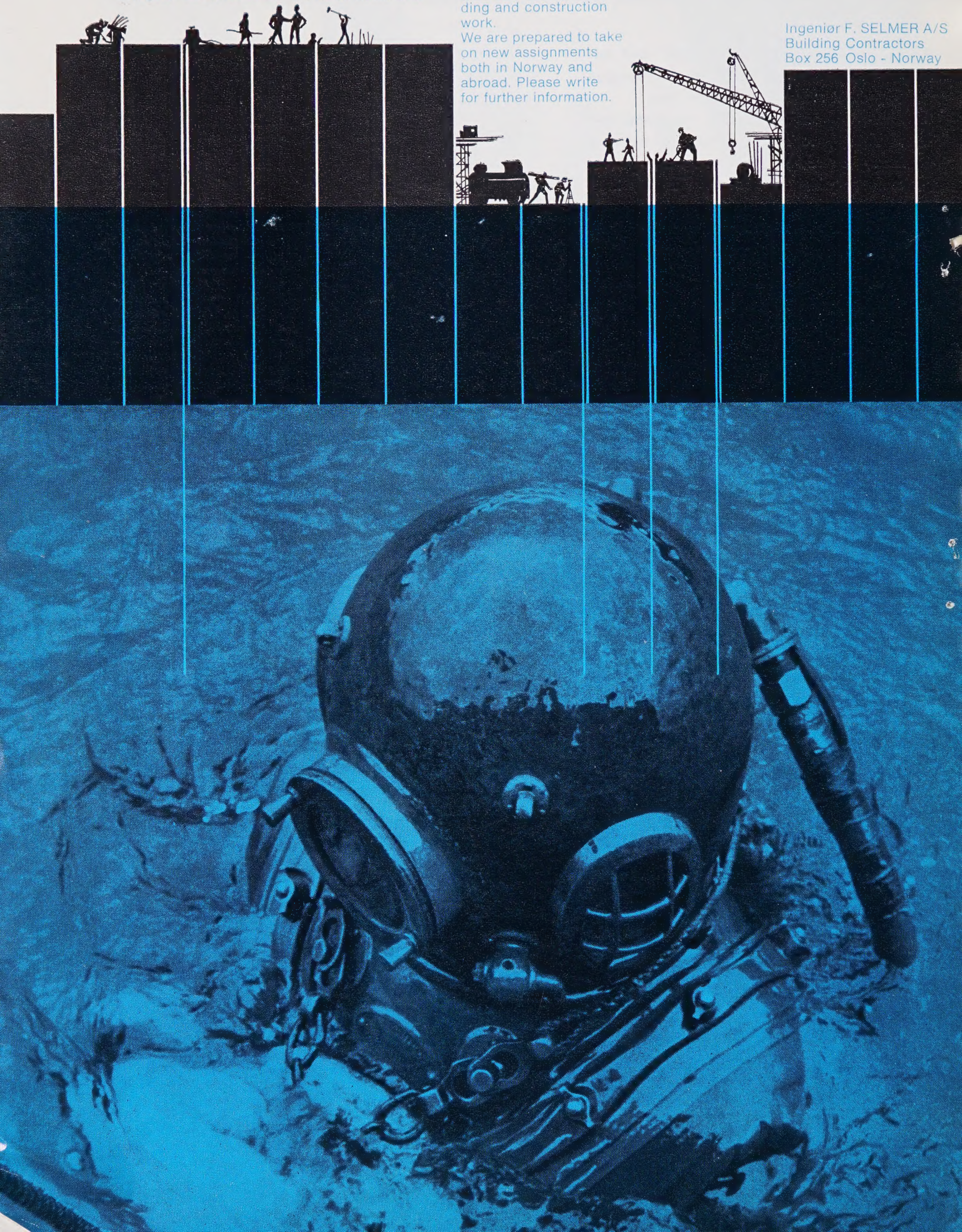
Our large staff of engineers and technical experts can draw upon a wealth of experience gained from hundreds of large-scale assignments at home and abroad, and we maintain the biggest and most diversified pool of constructional machinery and marine gear in Norway.
We have repeatedly proved our ability to tackle the biggest and most intricate building and construction work.
We are prepared to take on new assignments both in Norway and abroad. Please write for further information.

F. SELMER

Ingeniør F. SELMER A/S
Building Contractors
Box 256 Oslo - Norway



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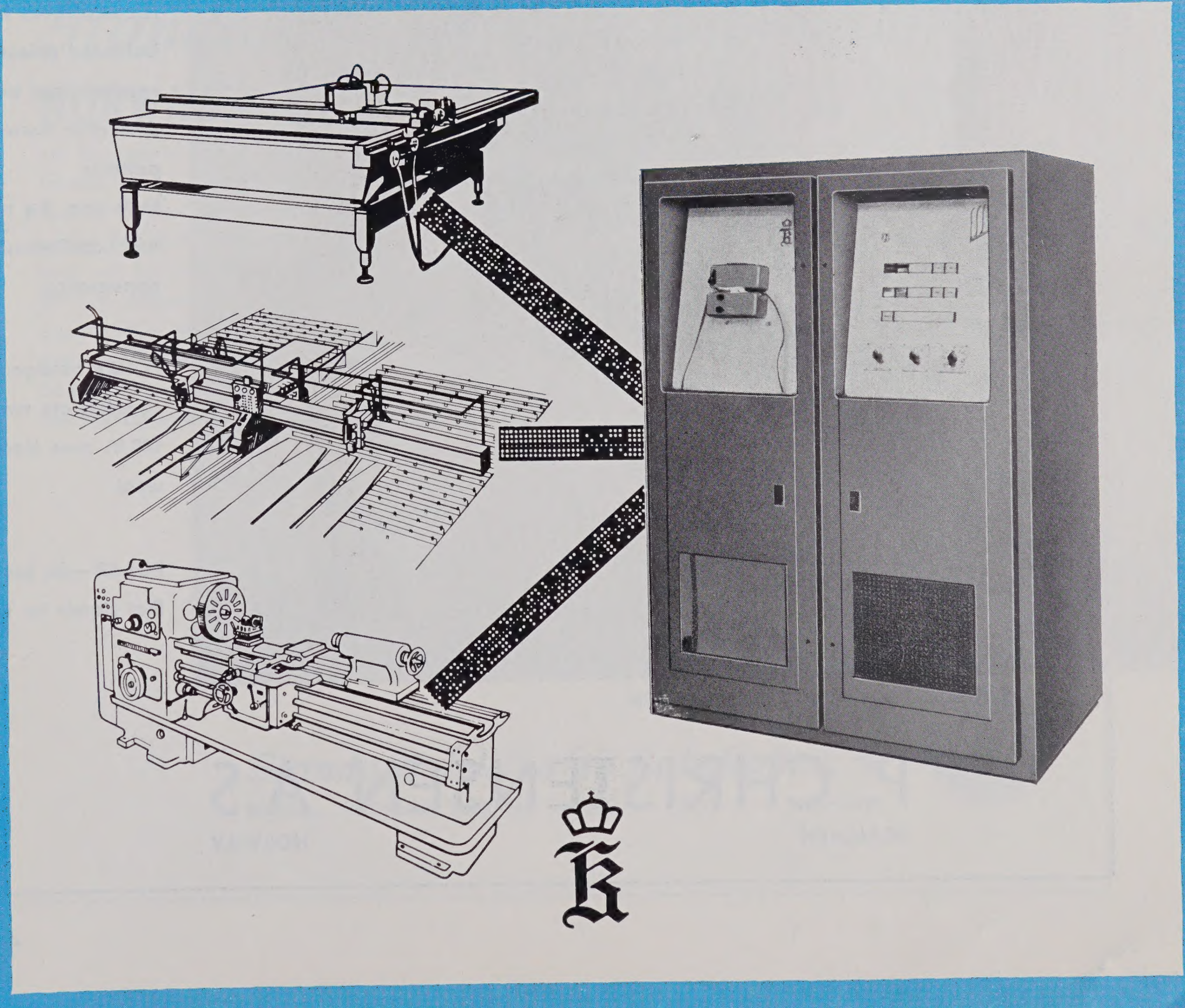
Numerical Path Control System for machine tools and coordinatographs.

ESSI KONGSBERG has the following important advantages:

High accuracy
High operation speed
Easy to operate
Reliability
Simple manual programming

Furthermore, this system offers excellent possibilities for extensive automation of design, drawing and production.



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A FEW ITEMS FROM THE NEW COLLECTION

Another
outstanding

POLAR

succe

P. Christensen A/S, Drammen - Norway, have scored yet anot great success with their superb quality cardigans and sweate

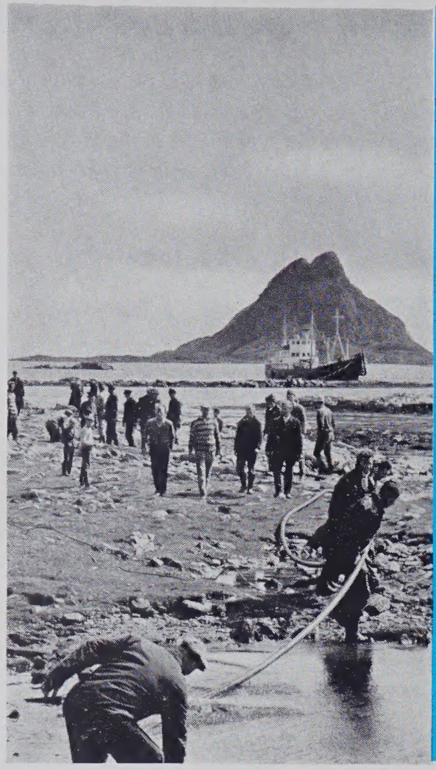
The new 1964 POLAR collection is conspicuous for its balanced colour combinations and distinctive Norwegian patterns. Note, too, the snug f and handknitted appearance.

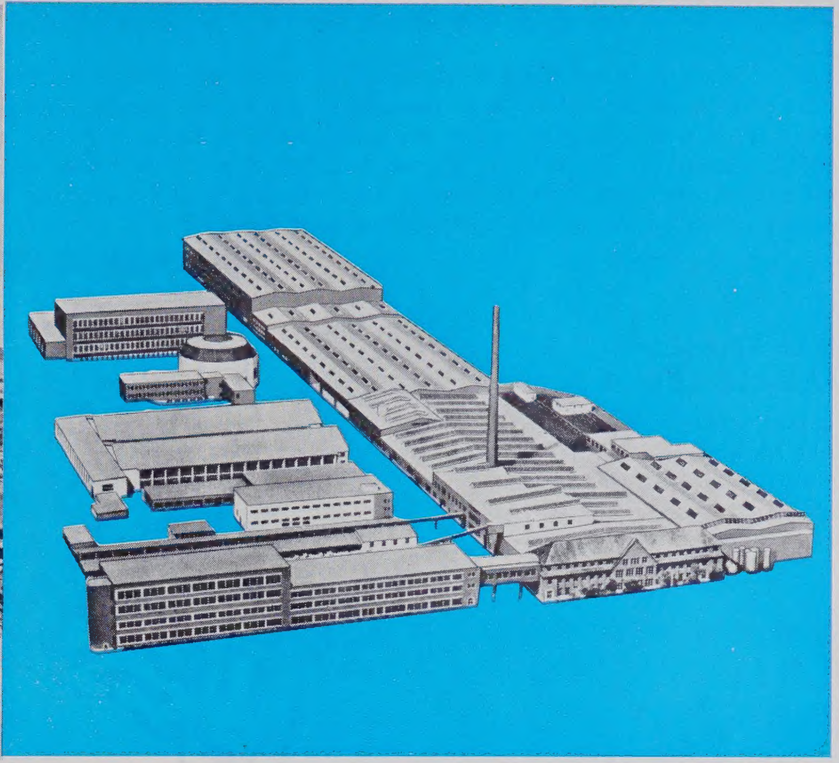
POLAR cardigans an sweaters are made o 100 % pure Norwegian wool.

POLAR—the brand that stands for quality.

P. CHRISTENSEN A.S

DRAMMEN **NORWAY**





Standard Telefon og Kabelfabrik A/S

NORWAY'S LEADING ELECTROTECHNICAL COMPANY

has for nearly 50 years played the most important part in the electrification of our country. Standard Telefon og Kabelfabrik A/S supplies electric cables and wires for all purposes: Subscriber, trunk, and coaxial communication cables — power cables — underground and submarine high and super tension power cables — ship wiring cables. Since 1946 Standard Telefon og Kabelfabrik A/S has produced and laid out by own cable ship some 1,400 km submarine cable. In 1956 Standard supplied the first 400 kV underground power cable. Other products: Automatic telephone exchanges — marine radio equipment — electronic process control equipment — radio detectors and survey metres — freezers.
Standard Telefon og Kabelfabrik A/S is the Norwegian link of International Telephone and Telegraph Corporation — ITT, — the world's largest international manufacturer and supplier of electronic and telecommunications equipment.

Standard Telefon og Kabelfabrik A/S
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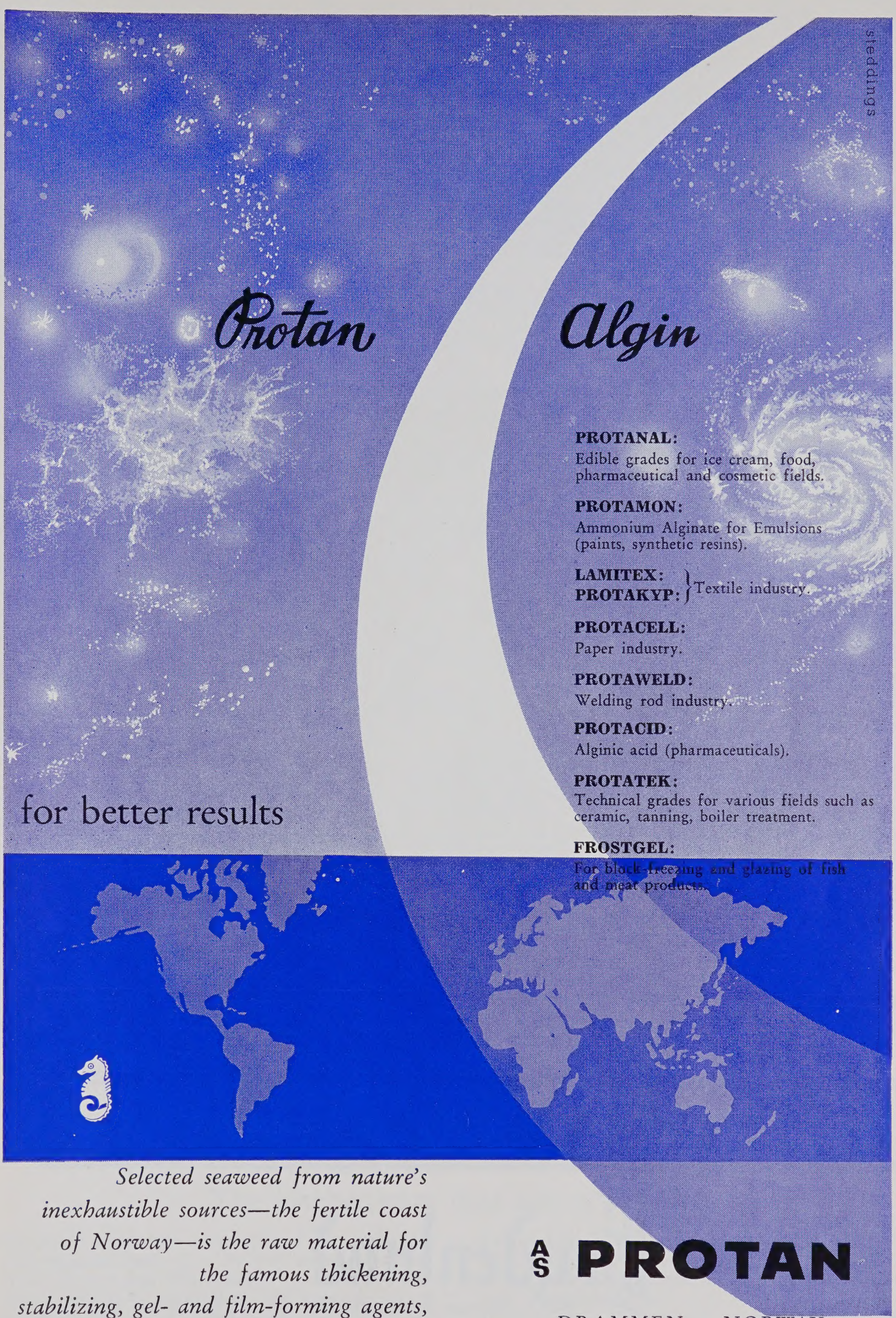

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PROTANAL:
Edible grades for ice cream, food, pharmaceutical and cosmetic fields.

PROTAMON:
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Alginic acid (pharmaceuticals).

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Frydenlunds beer is well known around the world where people gather to enjoy the best in life. Write for your nearest distributor.

Enjoy this wonderful

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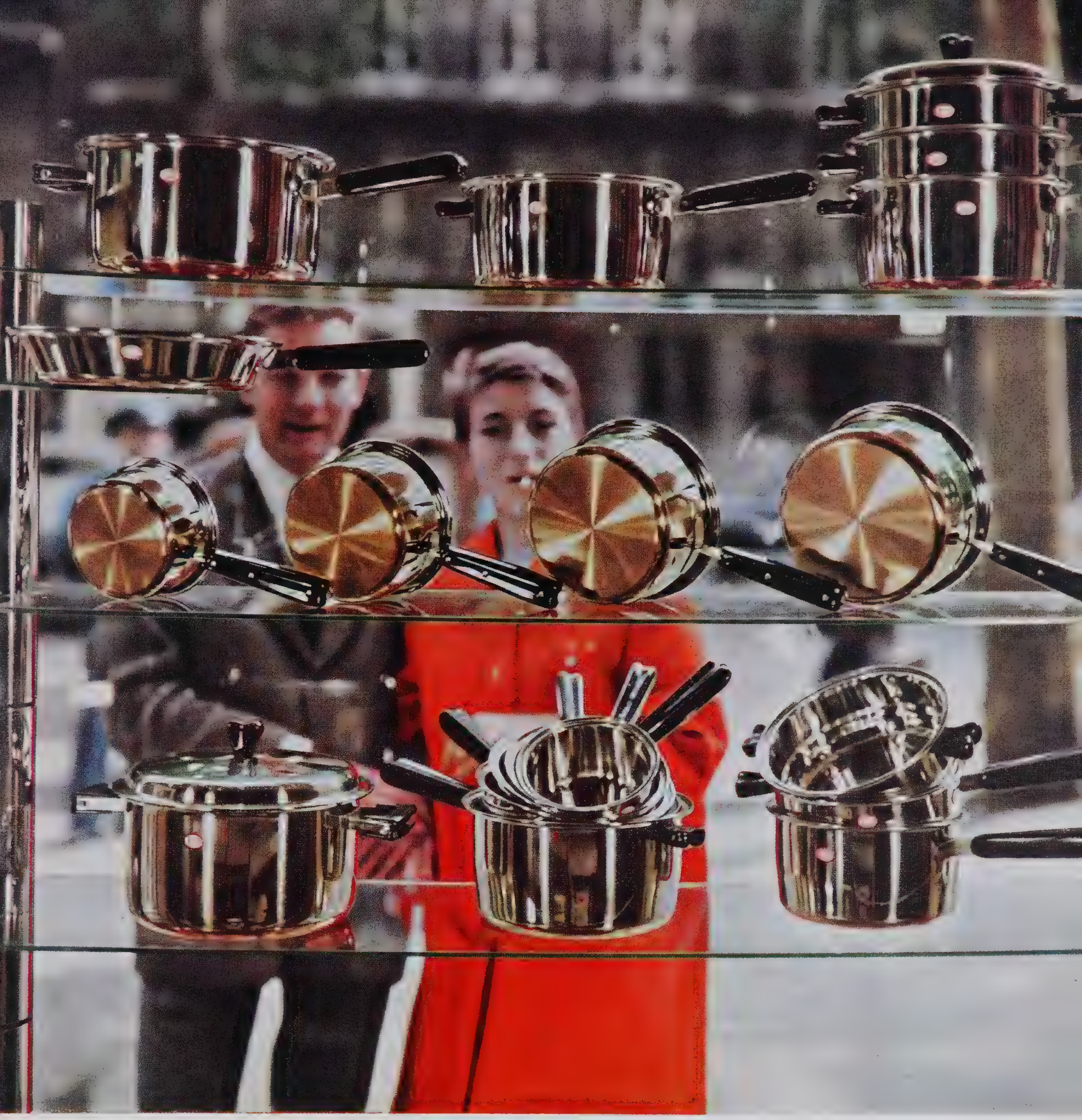
Frydenlund

- the largest brewery in Norway.

FRYDENLUNDS BREWERY - OSLO - NORWAY



POLARIS

The kitchenware that lasts a lifetime

POLARIS articles are manufactured from first class 18/8 Stainless Steel—i. e. the Steel contains at least 18% Chrome and 8% Nickel.

«18/8» quality is essential for the manufacture of household utensils of lasting satisfaction. The Copper bottom (electrolytical pure copper) is applied by a patented process and is so formed to ensure the best and most economical heat distribution.

Polaris Fabrikker is Norway's leading factory for Stainless Steel Kitchenware and its products are today increasingly exported to the principal markets of the World.

In addition to the cooking utensils POLARIS also manufactures a wide range of other Stainless Steel articles.

Every POLARIS article is fully guaranteed.

POLARIS FABRIKKER
SANDNES - NORWAY

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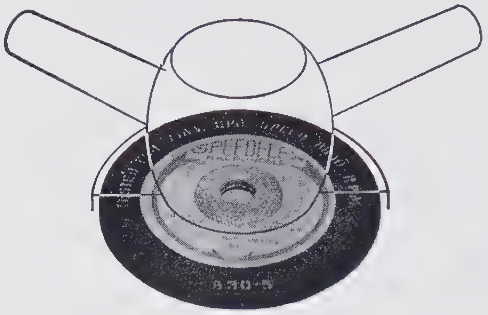

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Establ. 1898

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   Production in association with A/S Kværner Brug:
   Turbines, Gate valves, Butterfly valves, Draft tubes, Installation.

2. **SERVICE DIVISION**
   for hydro-electric power stations:
   Inspection, Automatic controls, Repairs, Constructional alterations, Preventive maintenance.

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   Special assignments, principally in the heavy sector and requiring a high standard of precision.

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Nitrogen pressure

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Since 1854 - world's largest producers of branded cod liver oil

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OSLO - NORWAY

The pipe for discerning smokers
LILLEHAMMER
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THE HALLMARK OF QUALITY
FOR 120 YEARS
G. Larsens Pipefabrik A/S - Lillehammer
NORWAY

For a happy anniversary

Schous - almost as old as the Constitution

Way back from the days of the Vikings, drinking beer has been good tradition. Actually, beer is part of Norwegian history. It is told that some members of the Norwegian Parliament took time off on May 17th, Constitution day, in 1845 to visit the Schous Bryggeri and to taste the newly introduced Lager-beer. The representatives were men used to hard work in a hard way, but they were also men who enjoyed the pleasant way of life. After their visit all the representatives left the brewery in very high spirits, agreeing that Lager-beer was both good and tasty.

To-day as in 1845, Norwegians know the pleasure of Schous beer. Good beer is tradition, and Schous traditions date back to 1821—almost as far back as the Constitution. Schous beer of to-day reflects 143 years of mastery in the art of brewing.

Today as for centuries— **Schou's**

The SAGA mink has taken fashion-conscious women by storm all over the world. Oslo Fur Auctions, Ltd.—the sales organization of the Norwegian Fur Breeders Association—is proud of being supplier of top-quality mink and blue fox to the world's leading furriers and fashion houses. Turnover at Oslo Fur Auctions in 1963: 1,000,000 mink skins and 90,000 blue fox skins at an export value of more than 18 million dollars.

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piston pumps.

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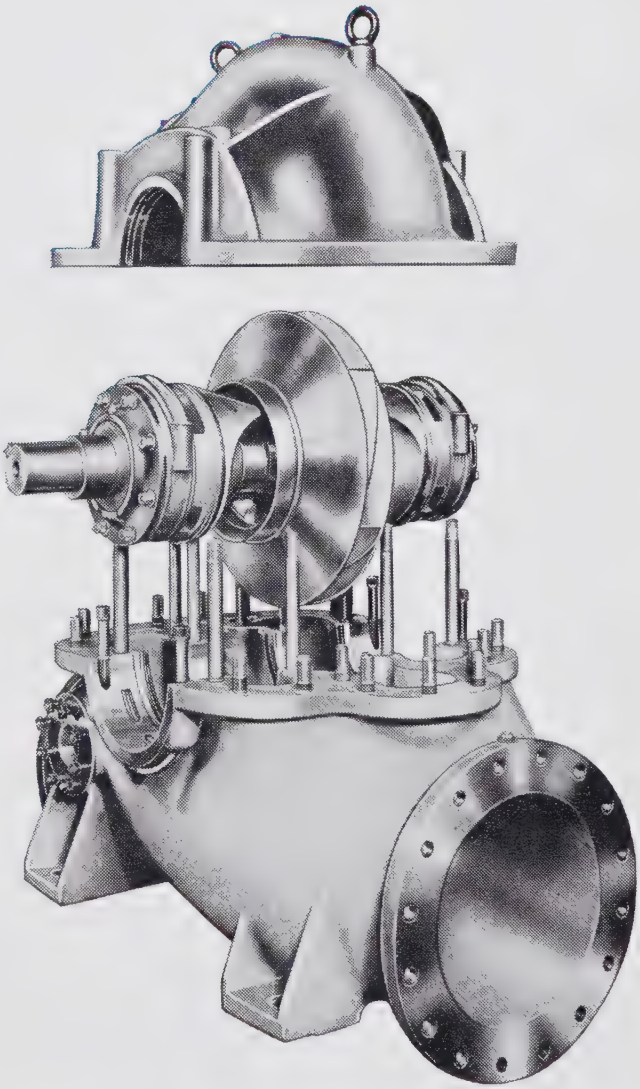
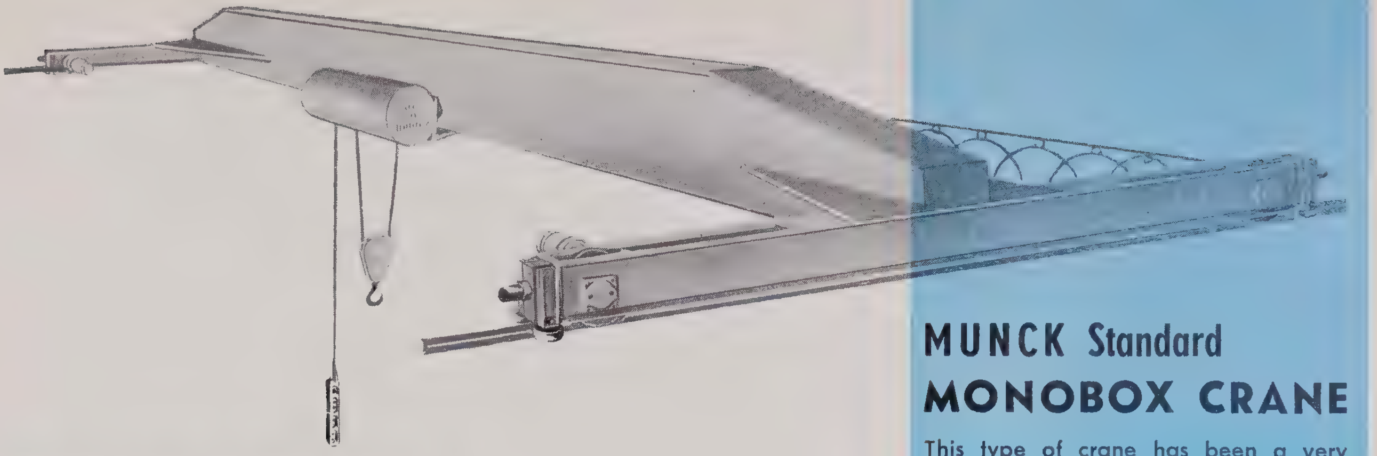


A·S EUREKA
MEKANISKE VERKSTED

SENTRALBORD: 55 84 90 - TEL.ADRESSE: «EURHART» TELEX: 1868
P.O.BOKS 155 - HOFFSVEIEN 1, SKØYEN - OSLO - NORGE



MUNCK Standard MONOBOX CRANE

This type of crane has been a very great success since introduced 2 years ago, and is now in service in Europe, Near and Far East as well as in North and South America.

MUNCK

HOISTS, CRANES
and
EXCAVATORS

MODERN DESIGN

QUALITY throughout

MUNCK
400

HYDRAULIC EXCAVATOR/LOADER

Every single component on the «MUNCK 400» is a result of 20 years experience in the manufacture of excavators.

FAST POWERFUL HYDRAULICS
Crowd cylinder gives 10,000 lbs (4600 kg) breakout force on the bucket.

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Care at every stage of production gives Norwegian cheese its specially fine flavour and maintains its high quality.

NORWEGIAN DAIRIES' SALES ASSOCIATION
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Norwegian Frozen Fish Ltd.

A complete line of quick frozen fresh sea products

NEWEST PRODUCTS OF NORWAY'S OLDEST INDUSTRY

- First-class raw materials from the ocean depths off Norway's mammoth coastline, beyond the Arctic Circle.
- A chain of modern deep-freeze plants.
- Skilled, accurate and hygienic workers, and
- A world-wide export sales organization serving every corner of the globe

form the background for FRIONOR's position on the markets of the world to-day.

Export Sales Organization for the Norwegian producers of Quick Frozen Fish, Fish Fillets, Prawns, Cod Roe, and other Sea Products.

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TELEX: OSLO 1252 - FRIONOR

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DRAMMENSVEIEN 20, OSLO - NORWAY

Norway's livestock is known throughout the world for its high quality and excellent health. Norges Kjøtt og Fleskesentral (Norwegian Farmers Meat Marketing Organization) represents more than 120,000 producers, holding membership in thirteen organizations with a network of modern slaughterhouses and processing plants. Norway's largest exporter of meat and meat products, wool, hides and skins, and breeding animals.

NKF

NORGES KJØTT OG FLESKESENTRAL

Lorenveien 37, Oslo, Norway. Telex no. 1302.

A NATION GROWS THROUGH THE DEVELOPMENT OF ITS MANUFACTURING CAPACITIES

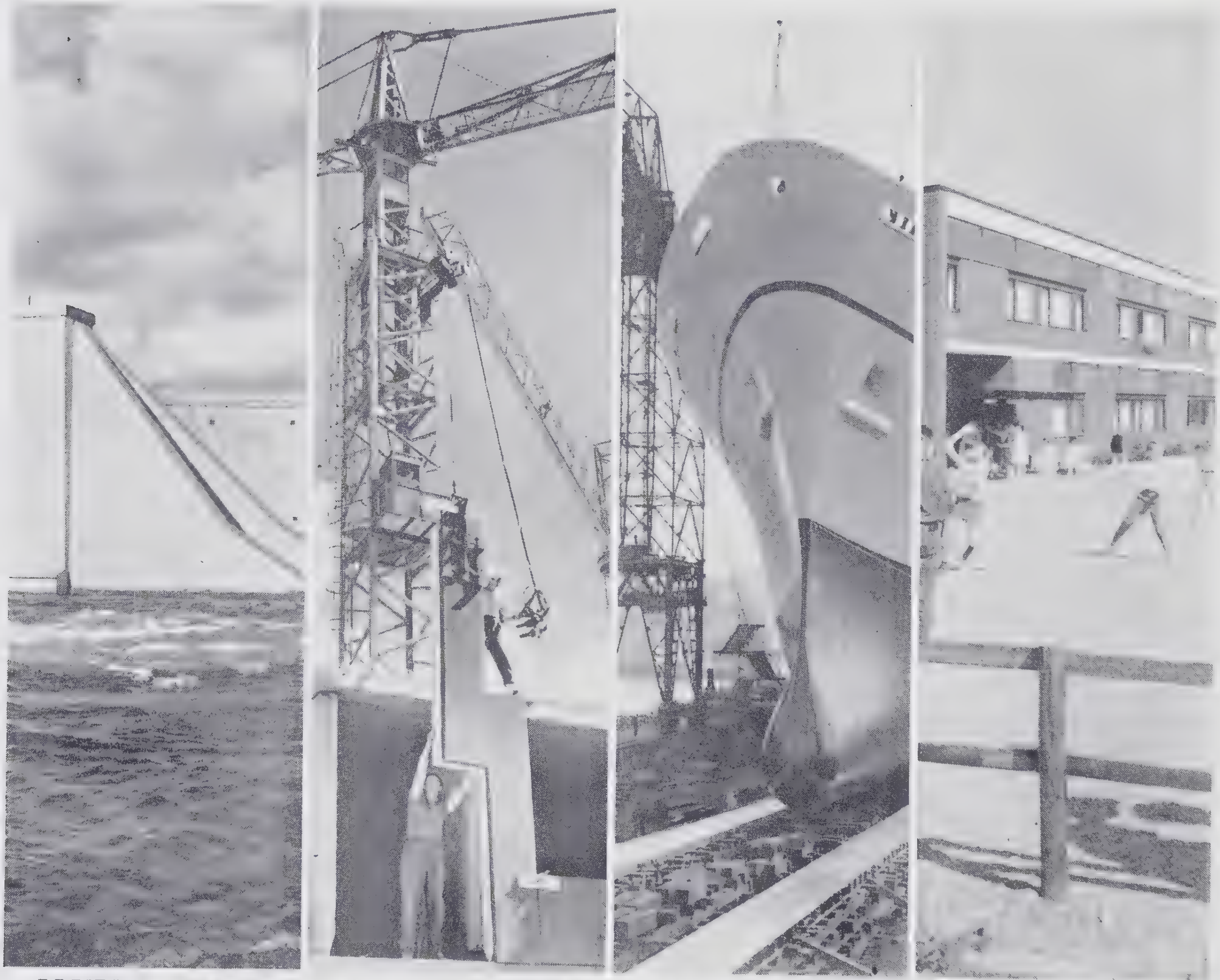
After the last World War Norway has had one of the world's highest investment rates — in the years 1946—1960 it has been about 21% of the national product.

This has contributed to an intense development of production and profits — the progress can be illustrated by some few, significant figures:

During the same period the production of electric power has increased from 11.3 to 31.1 billions kWh, industry's gross product from 2.6 billions N. Cr. to 8.6 billions N. Cr., whereas the gross product of shipping increased from 970 millions N. Cr. to 3.670 millions N. Cr.

Our firm has considered it as its task to contribute to the negotiation of the necessary financing, first and foremost within the sectors power works, industry, shipping and the development of the municipalities.

Through this activity we have gained insight and experience which we are glad to place at the disposal of trade and industri.



WELL-PLANNED FINANCING BRINGS PROGRESS

Kirkegt. 20, Oslo 1 · Telephone 41 76 96 · telex 1287

BØHN & CO A/S

Access tunnel at the new harbour area of Kristiansand, Norway. In the background the former built silo.

- **Marine Works: Graving Docks, Reinforced Concrete Piers, Dredging.**
- **Hydro Electric Works: Dams, Tunnels, Power Stations.**
- **Nuclear Reactor Buildings in Rock and in Free.**
- **Building Construction Works of all kinds.**

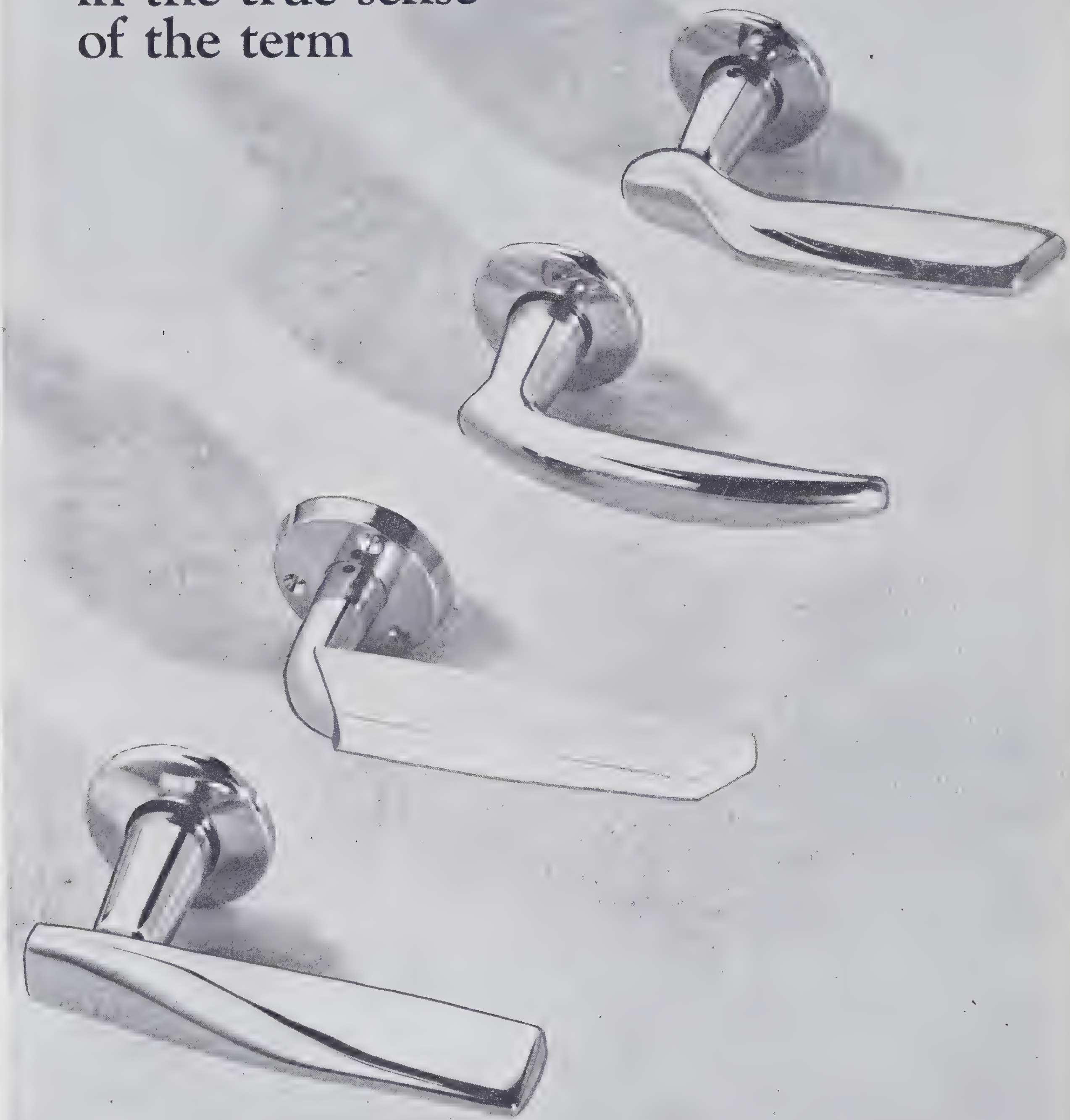
A/s Höyer-Ellefsen

CIVIL ENGINEERING CONTRACTORS
FOUNDED 1896

Dredging the harbour of Slagentangen, Norway.

88

Applied art in the true sense of the term



The Trio door-handles shown above are (reading downwards):

No. **2166** with plate no. **2520**	No. **2155** with plate no. **2520**	No. **2111** with plate no. **2511**	No. **2168** with plate no. **2520**

TRIO FABRIKKER
Helgesens gate 30 — Oslo
NORWAY

TANDBERG

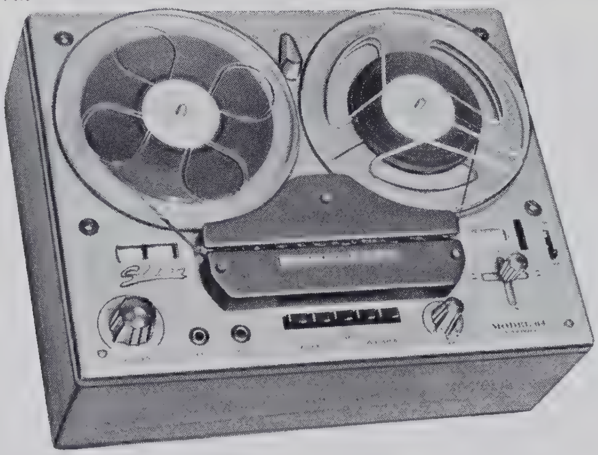
NORWEGIAN PRODUCTS OF INTERNATIONAL REPUTE

Tandberg exports to every corner of the globe. The most important markets are in countries where the level of industrial development is at its highest, and competition keenest – countries such as U.S.A., Great Britain and Sweden.

Tandberg products successfully compete by virtue of their quality. Tandberg Tape Recorders have three times been featured in American consumer reports and each time the Tandberg product has emerged on top – ahead of leading makes from all over the world.

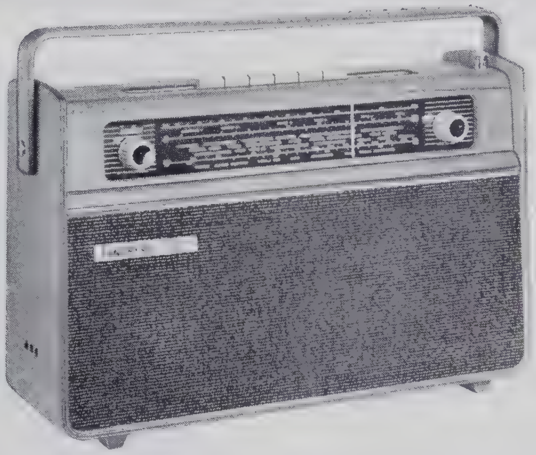
The tremendous demand for Tandberg products has necessitated large-scale expansion of the company's plant. In less than a year the number of employees has risen from 500 to 800, and a new plant designed to provide work for a further 500 is in course of erection.

In 1963 exports soared by 60 per cent and this year's rapidly rising sales foreshadow yet another all-time high.



TANDBERG TAPE RECORDERS

are renowned the world over for their quality. Government institutions, professional musicians, and discriminating amateurs – all who value quality and perfect reproduction choose Tandberg.



TANDBERG TRANSISTOR RADIO

With its superlative technical qualities and attractive design the new Tandberg Transistor Radio is fast establishing a firm position on the export market.

COLONOR

QUALITY PAINTS

Keen representatives wanted!

COLONOR A/L is the new production and export organization of the Norwegian paint and varnish industry.

The COLONOR range of paints, varnishes and lacquers includes specialities for industrial application, motor-vehicle paints and anti-corrosive paints, as well as various outdoor and indoor paints for masonry, concrete, steel constructions, wood etc. in attractive modern colours to suit every taste.

New representatives are required in various countries throughout the world. Only reputable and well-established import agents and importers will be considered.

Applications should be submitted to:

COLONOR A/L
Drammensveien 126 B, Oslo 2 - Norway

MANUFACTURERS · COLONOR · EXPORT GROUP OF NORWEGIAN PAINT AND VARNISH

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LARVIK KAROSSERI A.S
LARVIK - NORWAY

THAU

Eggs FROM NORWAY

All the eggs marketed by Norske Eggcentraler S/L are subjected to a meticulous checking routine, of which translucency test forms part. The control is carried out at laboratories, supervised by highly experienced experts.

The very highest quality and the most modern of plants are a matter of course in Norwegian egg production.

Norske Eggcentraler S/L
OSLO 4, NORWAY
Telegrams: Eggcentral
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ESKIMO terry socks are unbeatable for wear with ski and rubber boots. Terry-knit on the inside and incredibly hard-wearing, they keep out the cold no matter what the weather.

ESKIMO terry socks are of superior quality and are made of 80 % Norwegian wool and 20 % polyamide fibre. They are made to suit men, women, and children.
Sizes: 4 to 12.

ESKIMO sport stockings are available in a great variety in colours and sizes.

ESKIMO mittens — warm and comfortable.

Ask for our quality products!

BRÅTENS FABRIKKER

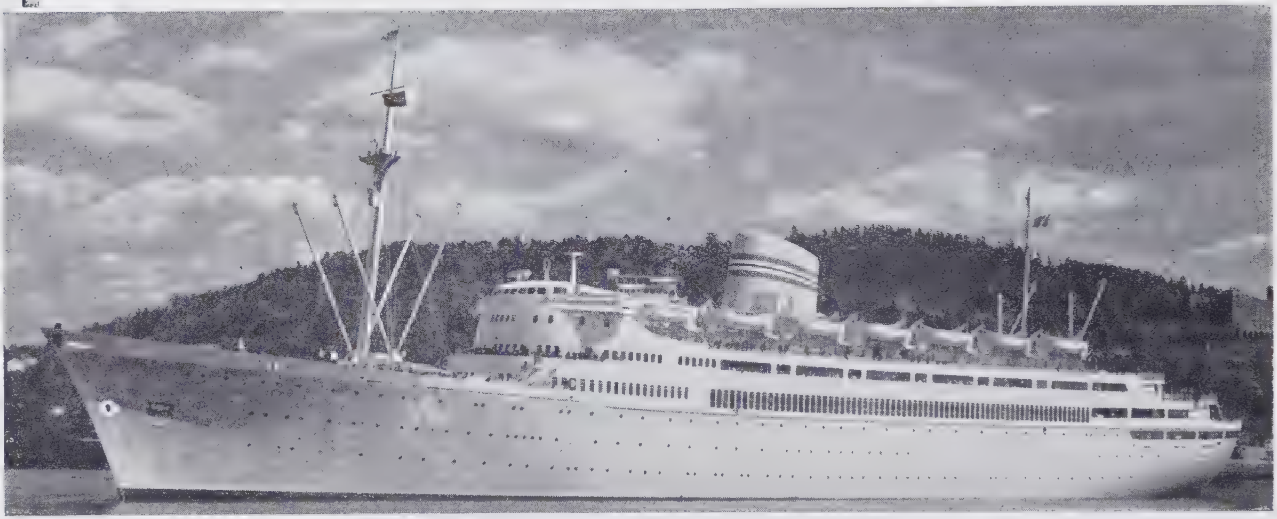
GRESSVIK - NORWAY

AKTIVITT-ENAMEL

against rust and corrosion

TODAY IN HUNDREDS OF SHIPS ON ALL THE SEVEN SEAS

M/S "BERGENSFJORD"



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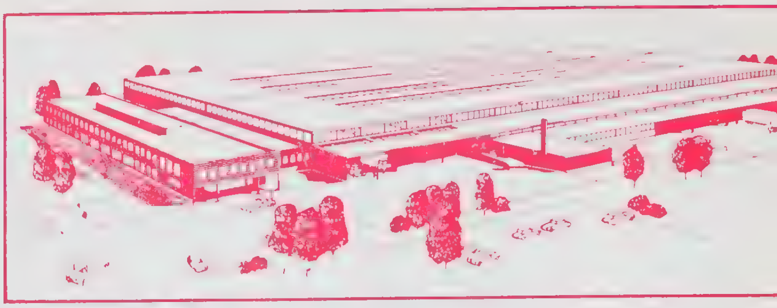

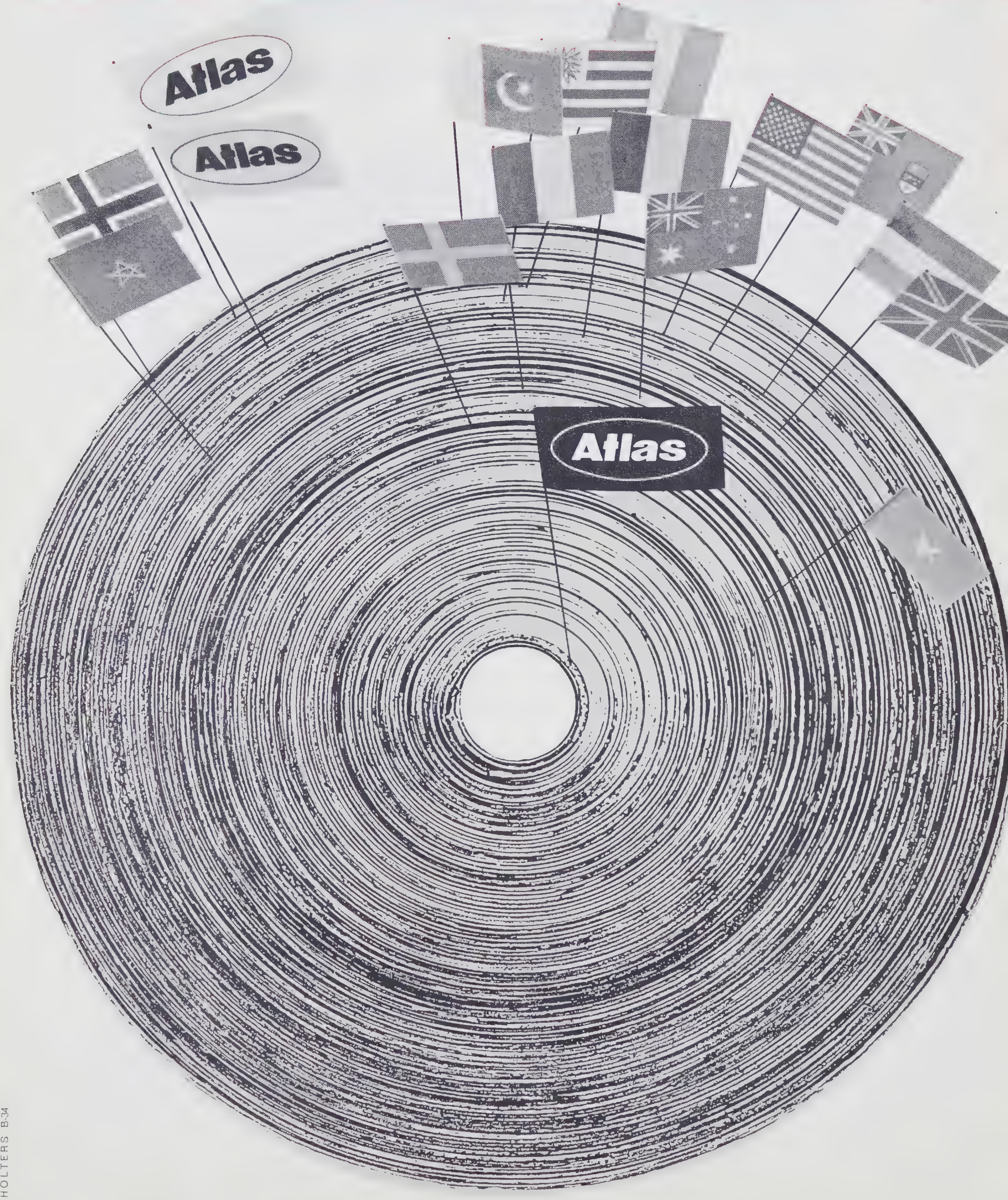

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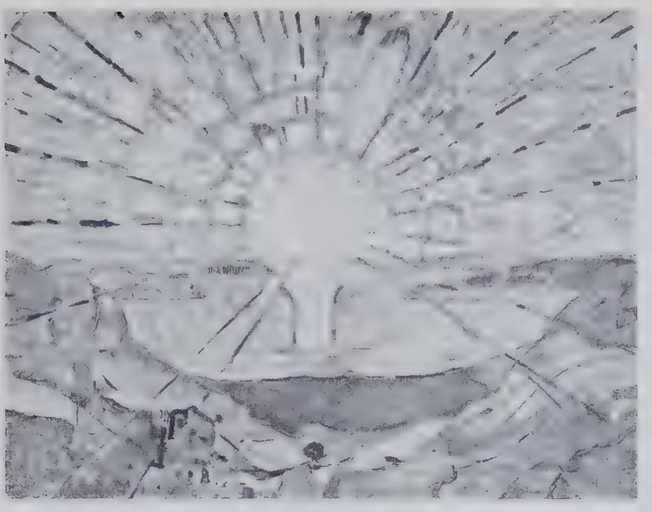

The Sun — by Edvard Munch.

NORWAY

150 YEARS OF PROGRESS

Concerned with trade promotion, the Export Council of Norway has no political affiliations, but it believes in the freedom of nations and men, which is the spur to endeavour. Therefore the Export Council of Norway through this publication joins in celebrating the 150th anniversary of the 1814 Constitution. The Constitution declared and secured the basic rights. On that foundation Norway grew, not only politically, socially, culturally, but also economically. Norway's trade and shipping have spread world-wide. Exports have increased in variety as well as volume. Imports have increased correspondingly, and Norwegians enjoy prosperity and opportunity. Without national independence and personal freedom, progress might still have been made, but probably it would have been slower and the fruits would certainly have tasted less sweet.

THE EDITOR

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Ole Knudsen

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Oslo

The Storting Building, Oslo.

The 1814 Constituent Assembly.

The building at Eidsvoll where the Constitution was agreed.

On the occasion of the 150th anniversary of the Constitution of 1814, I am delighted to have the opportunity to send greetings to friends abroad through the medium of this publication. From the Constitution stems our Storting—or Parliament—and our democratic procedures. In the Constitution are embodied our independence as a nation and our rights as citizens. Small wonder that Constitution Day on 17th May is celebrated every year with enthusiasm.

Whilst it is usual to interpret the Constitution chiefly in political and legal terms, no one will deny the stimulus which democratic rights and liberties have provided in other fields such as the cultural and the economic. No incentive is more rewarding in results than freedom, and the last century and a half since the promulgation of our Constitution have borne richer fruits than any other period of our history.

Free as a nation, free as individuals, we have laboured to create an economy with a high standard of living and with a variety of products which we can offer other nations in exchange for theirs. Norway, with limited natural resources, lives by exports, and our producers have shown ingenuity and initiative in providing as large as possible a range of goods for sale abroad. I am sure that our Constitution, with its emphasis on national independence and the freedom of the individual, has played no small part in releasing the energies of our people and not least in production, in trade and in shipping.

Nils Langhelle

NILS LANGHELLE

PRESIDENT OF THE STORTING

NORWAY— a nation growing

A third of Norway lies beyond the Arctic Circle, and still further north lie the Norwegian possessions Svalbard (Spitzbergen) and Jan Mayen.

In the following pages, emphasis is more on the present than the past, more on the future than the present. The adventure which all share is the journey into tomorrow.

The emphasis is, however, materialistic, not because everything else necessarily springs from a materialistic basis, but because it provides a useful guide to progress on a relatively objective basis.

Norway is a small nation on the face of the earth, possessing no resources of great international importance, depending on a high level of international trade and shipping. Not itself able to influence that level, it is entirely the victim in bad times and the beneficiary in good times of the world economic climate.

Whatever is done in Norway, the fact is that it is indivisibly part of the giant world, and cannot advance and succeed alone.

No doubt not even the most remote and secluded community can exist separate from the rest of the world, but per capita Norway has one of the biggest import and export accounts, and this, plus its shipping, makes it particularly vulnerable to world trade trends.

Within the ambit of its own domestic deliberations and decisions, Norway does its best to ensure the most sensible deployment of its resources. This is very necessary because Norway is not naturally rich. Indeed, it is naturally poor.

Norway is one of the most thinly populated countries in Europe, perhaps in the world. Population is only 3.7 million. Area is as large as the British Isles which has a population of about 50 million.

Only about 2.5 per cent of the surface of Norway can be tilled and cultivated. Forests cover almost 25 per cent, but almost three-quarters of Norway is mountain, which, technically speaking, is land above the tree-line, where nothing grows.

The land, consisting mostly of grey granite, is broken by high hills and towering mountains, by deep valleys and by even deeper water-filled valleys called fjords. In addition, some 100,000 islands skirt the long indented coast.

This is not a land bathed in tropical sunshine. Lying on the far north edge of Europe, Norway extends hundreds of miles beyond the Arctic Circle. This is the land of the midnight sun—in summer—but in winter it is the land with little or no sun at all.

Beneath this land, prospectors have discovered no oil or coal that can be commercially exploited. Even the iron ore is low in iron.

In spite of this, the standard of living in Norway is one of the highest in the world. Some estimates suggest that within the span of this generation, the standard of living in Norway may be as high as any in the world.

It is fair to point out certain advantages which Norway enjoys. In spite of its northern situation, the North Atlantic Drift brings balming warm currents to Norway's shores. This in turn brings fish to spawn in Norwegian waters, and also ensures that no Norwegian ports are icebound even in winter. And the soil is fruitful in the brief summer. The Atlantic also carries cloud and rain to Norway, which cascade and collect in mountain reservoirs. For centuries, water-wheels have turned in Norway, powered by rivers springing from those mountain lakes. For the last half century, electricity has also derived from that water, providing in large quantities the cheapest power in the world.

The forests of Norway covering a quarter of the surface have also been valuable, providing since the beginning the means of survival in terms of fuel and shelter and transport, and later becoming the raw material for pulp and paper mills.

The sea that envelops Norway north, west, and south was once a gulf that divided, but it became a means of communication and expansion. Not only the fisheries, but also the shipping industry has thrived on the training and the expertise which Norwegians have gained from their exceptionally close and essential communion with the sea and the channels around their long and convoluted shore.

Norwegians, not blessed with outstanding worldly wealth, should still count their blessings.

Along the same world parallel of lattitude, lie territories steeped in everlasting snow and ice—Greenland, Alaska, and Siberia.

Norway not only breathes, but bustles. It is part and parcel of the world community, despite its northern situation, despite its mountainous and broken and watery configuration.

True, it supports few people. True, it does not weigh heavily in the world scales. But within the ambit of its capabilities, stretched perhaps somewhat, it is working consistently to improve its material standards, and its standards in a number of other fields.

It is probably a country worth trading with, selling to, and buying from.

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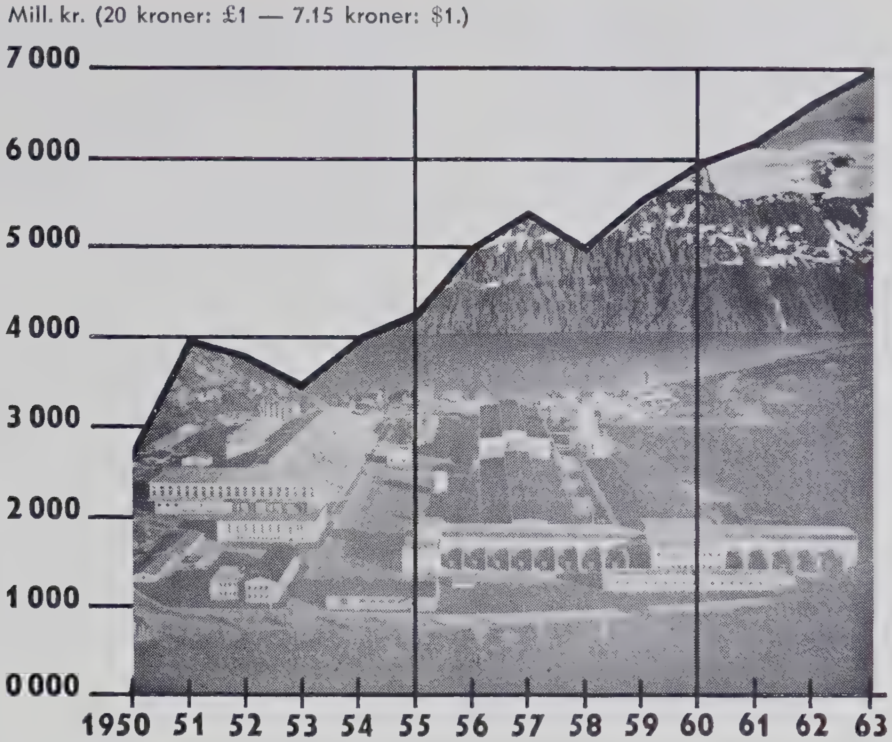
WORLD WIDE CARGO SERVICES

THE EXPORTS OF NORWAY



The increase in Norway's exports is shown in this graph. The photograph shows a chemical plant north of the Arctic Circle.

From the north of Europe, from the outpost that is Norway, commodities are dispatched to 100 markets the world throughout. Traditionally Norway relied on a limited range of exports, dried cod, granite, logs, even ice hacked from eternal glaciers. These were not foundations for prosperity, and when growth accelerated in more fortunately situated countries and when coal and steam and steel built fortunes abroad, Norwegians held back by the paucity of their own natural resources emigrated by hundreds of thousands to richer lands. That exodus is within living memory. But within living memory, conditions have changed for the better. Emigration is down to a trickle, whilst production and exports grow ever in volume and variety.

The staples that down centuries provided the main planks of survival are still important, but generally in more sophisticated and valuable forms. Fish, the provider of sustenance since the beginning of human life in Norway, is still one of the main ingredients of Norway's exports. Now it goes abroad in many forms, not only dried and salted, but fresh and frozen, canned and cured. With mounting ingenuity, the catch has increased and much is converted to meal and oil to ensure that nature's bounty shall not, as so often in the past, be equated with a ruinous glut.

Among staples, timber can hardly be denied first place. The forests that so bravely have endured the cold climate and the thin soil have ever been a rich reserve, providing the wood for fuel and shelter and earning the currency for international exchange. The currency has steadily mounted with the increasing refining of the raw timber, from log to sawn and planed wood, from wood to pulp, from pulp to paper, from coarser to finer paper grades, from chemical pulp to rayon fibre and yarn, from pulp waste alcohol to a variety of chemical products. Timber, the oldest of Norway's raw materials, is also in many ways the youngest, full of exciting new possibilities which ensure that its export yield will increase rather than diminish.

Ores and minerals are another traditional resource which long has been exploited. Iron ore, pyrites, and ilmenite are the main exports.

New in this century is the large production and export of metals—ferro-alloys and aluminium particularly, but also iron and steel, magnesium, copper, zinc, lead. These now in total rank first among Norway's exports, and the key to their growth is the availability of cheap, plentiful hydro-electric power. Even though much of the raw material has to be imported from afar, Norway's metallurgical industry is highly competitive on export markets, and indeed the great bulk of output is exported.

The chemical industry likewise has grown up in this century on the basis of cheap hydro-power. This is an inspiring story of technical invention and business vision which together have created an industry which none would have dreamt of a century ago. Chief element is nitrogen extracted electrolytically from the atmosphere. Nitrogenous fertilizers are the principal product.

In the wake of industrial expansion has grown up engineering and manufacturing enterprises which increasingly are finding markets abroad for their products. It is natural that many of these products stem from fields of activity where Norway has special experience—equipment for fishing and fish processing, for forestry and wood processing, for ships and shipyards, for hydro-electric power generation and transmission. A large experience in these fields ensures products of high efficiency and reliability.

Yet, as technological advance continues, the range of manufactured products spreads wider and exports grow still more diverse. Imported by many countries are adding machines and cash registers, portable radios and tape recorders, hoists and cranes, manufactured in Norway.

Designers and craftsmen together have built up a pleasing export of such domestic articles as furniture, glass and china, silver and pewterware, cutlery and kitchenware in stainless steel, and similar objects for the modern home. Outstanding in recent years has been the success of the textile and clothing industry in building up foreign sales, particularly in the sports and leisurewear field.

Even agriculture, in a land where less than 5 per cent of the surface can be cultivated, is contributing to Norway's expanding exports. Wool from Norway's sheep is of course a renowned ingredient of much of fabrics and garments from Norway, but cheese and butter of excellent quality are also finding a market abroad.

This then is the background to Norway's growing exports, described in more detail in the following pages.

THE WHITE COAL

Norway, a century and a half ago, was a practically pre-industrial nation. Without coal of its own, it was at a disadvantage in the new steam age. The small iron industry was based on charcoal smelting. Saw mills were operated by means of the primitive water wheel. The textile machines which were installed in the mid-19th century were also operated by water wheel. The oil and gasoline age which developed later in the 19th century was also of remote interest at first, because Norway had no oil resources of its own. Norway had to import coal and oil to power its slowly growing industry. Only at the close of the 19th century did suddenly and unexpectedly a new native source of power become available, again from water, but now in the convenient and competitive form of hydro-electricity.

Cheap and plentiful electricity generated from water power is the key to the industrial expansion which has transformed the economic condition of Norway in the 20th century. Norway's «white coal» has created new employment, new production, new exports, and a country relatively poorly endowed with natural wealth has found new opportunity for progress.

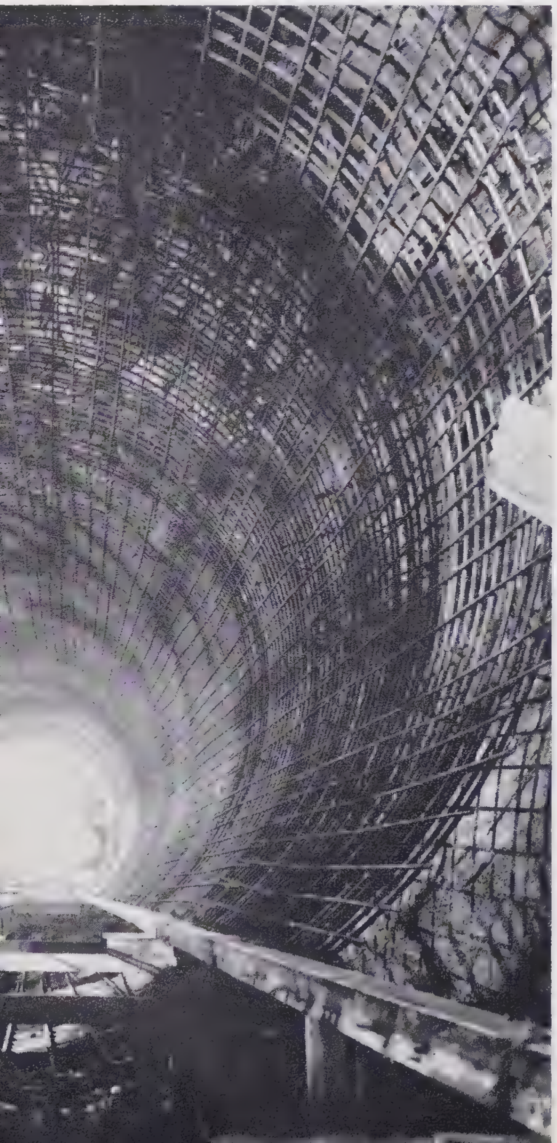
Norway is now the most highly electrified nation on earth. With a population of 3.7 million, electricity output in 1963 was 40,000 million kilowatts-hours. In 1953 it was under 20,000 million.

The rate of hydro-power development has been accelerating rapidly since the last war. The average annual growth of generating capacity was 130 MW from 1946 to 1950, 260 MW from 1951 to 1955, 405 MW from 1956 to 1960. From 1950 to 1960 the capacity of hydro-power stations increased from 3,000 to 6,200 MW. By the end of 1963 installed capacity was 7,900 MW.

In the present 4-year period 1962-65, generating capacity is being increased at the rate of about 600 MW a year, and by 1965 total capacity should be 9,200 MW. With normal precipitation, this will give an output of about 45,000 million kWh a year.

It is expected that by 1970 output will be about 60,000 million kWh. About half the economically exploitable water power resources of Norway will then have been harnessed. If development continues on the basis of a doubling of consumption during the decade up to 1980, the remaining part of Norway's exploitable water power resources will be exploited, giving a total annual energy

Miles of tunnel are blasted through rock to carry water to the power plants.



A power station built deep inside a mountain.

A chemical plant at Rjukan built close to the source of power.

A barrage dam under construction.

output of about 120,000 million kWh. There must however be some uncertainty in view of the development of other forms of energy, such as atomic power and natural gas.

The harnessing of water power at the present rate demands an annual investment of about 1,000 million kroner (£50 million, $140 million). A large part of this amount is expended on the massive construction work, in particular the blasting of tunnels and caverns inside the mountains, and the manufacture of turbines and generators and transformers. However, investment is also heavy in developing transmission lines and grids which eventually it is hoped will link practically the entire country so that shortages due to water scarcity or increased demand in particular areas can be compensated by transfers from other areas. Likewise, increasing attention is being given to cooperation with Sweden through link-ups permitting transfer of power in either direction according to demand peaks and power surpluses from time to time.

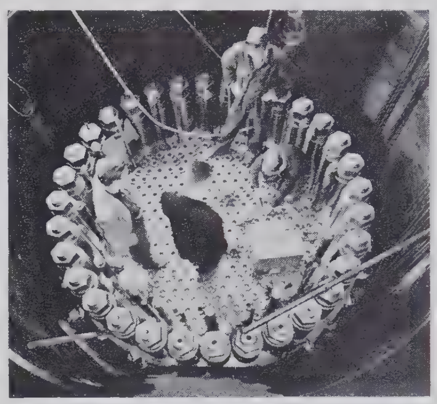
Behind the massive build-up of Norway's hydro-power resources lies the seemingly insatiable demand from both industrial and domestic users. Two-thirds of power output is absorbed by industry, and in particular by those heavy power consumers, the electro-metallurgical and electro-chemical industries.

Metals and chemicals have become major exports due largely to the advantage deriving from cheap hydro-electricity. It is to enable these productions to expand even more that water power is being harnessed as rapidly as possible.

In addition, domestic consumers are taking far larger quantities of electricity than before, in particular for heating. It is part of national policy to supply electricity to every home, and in spite of difficult terrain and thinly scattered habitation, electricity has now been installed in 99.9 per cent of Norwegian homes. Only 7,000 persons were without electricity in 1963.

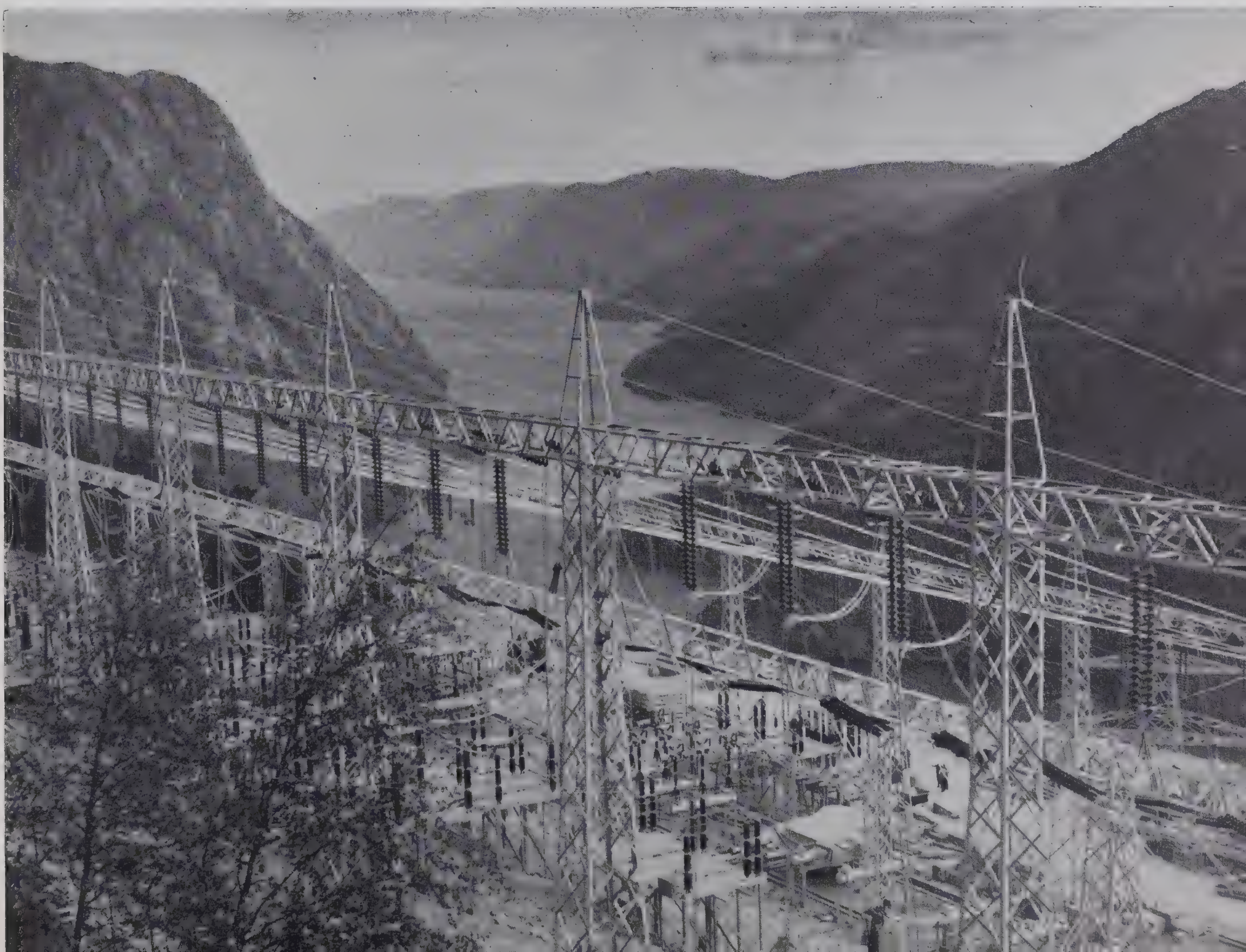
ATOMIC ENERGY

Steam produced by the boiling water reactor at Halden, Norway, is to be piped this year to the neighbouring paper mill Saugbrugsforeningen. The reactor, designed and engineered in Norway, is the first of its type in the world. It is being run experimentally by a team of nuclear physicists from a number of countries. Norway's Atomic Energy Institute is working on a programme for developing a reactor for ship propulsion, and the experience and data gained from the Halden reactor are valuable in this connection.

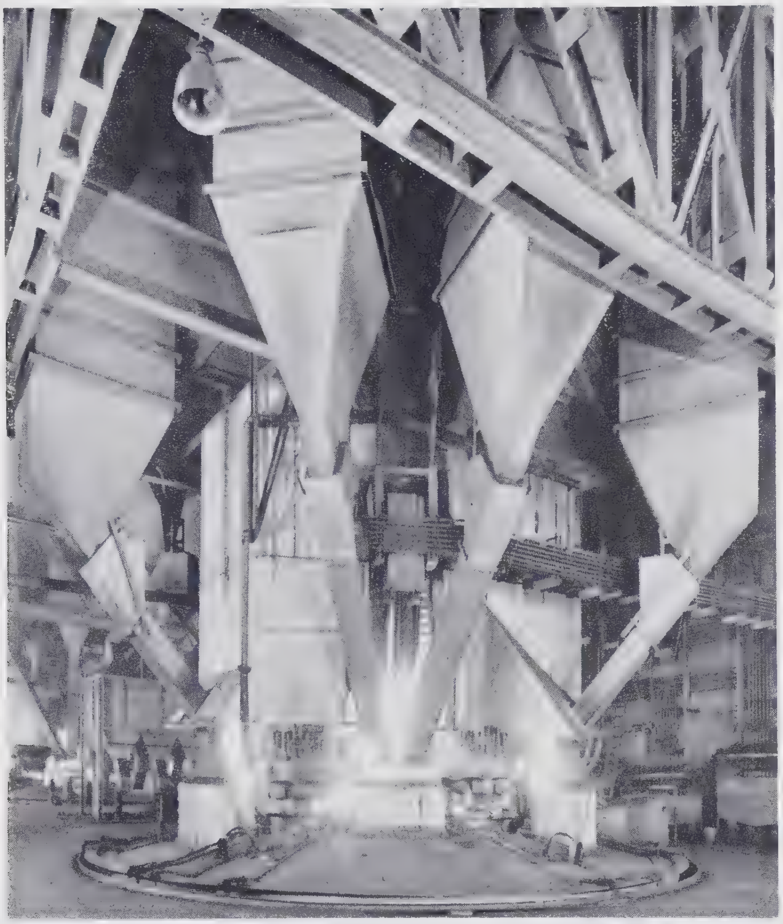


Halden reactor under assembly.

A 400 MVA switch yard.



METALS AND CHEMICALS



ELKEM electric pig iron smelter.

In 1814 the economic scope of Norway was limited by the relatively few natural resources at hand. Even the small iron industry which had flourished for a time on the basis of charcoal smelting was in demise following the introduction of the new Bessemer coke process abroad. Water wheels still turned, but they looked distinctly antiquated as the steam engine started taking over. Without coal or oil or other rich mineral resources, the industrial future of Norway looked bleak, and this was reflected throughout the century by the large number of Norwegians who emigrated. It was only as the century drew to a close that the new possibilities of hydro-electric industry became visible.

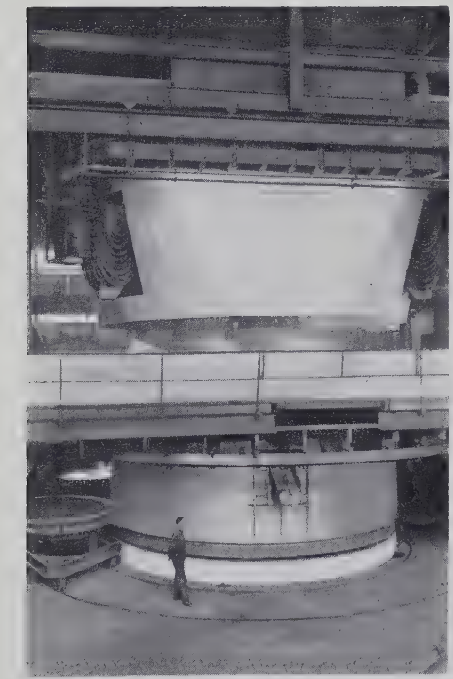
Hydro-power was the key to the new immense industrial horizons which started opening up for Norway at the beginning of the 20th century. Electricity from water power was cheap and prompted the development of industrial processes which could only be effectively exploited on the basis of ample supplies of low-cost hydro-electricity. The Norwegian professor, Kristian Birkeland, together with engineer Sam Eyde, developed the electric arc process for extracting nitrogen from the atmosphere. Electric furnaces and continuous self-baking electrodes were also developed in Norway early in the century and were to become world articles. Electric smelting has indeed become a Norwegian speciality, and the company Elektrokemisk A/S designs and supplies electric smelting plants for erection throughout the world.

Hydro-power development and the growth of the electro-metallurgical and electro-chemical industries have gone hand in hand. Generally the power and production plants have been situated in close proximity, in remote rural districts close to the water source, and thereby new employment opportunities have been spread throughout the country, stabilizing and strengthening the local economy. At the same time the new industrial undertakings have been situated with easy access to excellent deep-water ice-free shipping quays. This has been essential because the greater part of output of both the electro-metallurgical and electro-chemical industries is exported, and for a number of products a considerable import of raw materials is also necessary.

The production of metals and chemicals which Norway has developed in this century is significant not only for its own sake but also because it has provided the basis for an expansion of auxiliary manufacturing industries and also provided a stimulus to scientific research and technical training. In short, the growth of hydro-power and electrical industry has not only broadened the economy but enriched the community in the widest sense.

Chemical plant at Heröya, south of Oslo.

One of the largest ferro-silicon smelters in the world, at Fiskaa Verk, Norway. Capacity is 24,000 kVA (18,000 kW).



Today, aided by the continuing and mounting development of hydro-electric power, Norway is expanding its output of metals very substantially. Indeed it is the metallurgical industry that has made the greatest progress in recent years. Whilst industrial production generally increased by 50 per cent from 1950 to 1960, production of metals went up almost 200 per cent.

Electric smelting of native and imported ores is behind this development. Norwegian ore is used by the iron and steel industry, which has made notable progress in the last decade or so. In 1953 pig iron production was under 60,000 tons, whilst in 1963 it was 415,000 tons. Steel output in 1953 was 110,000 tons, whilst in 1963 it was 550,000 tons.

Norwegian production and export of iron and steel are insignificant in a world perspective, but production and export of ferro-alloys, in particular ferro-silicon, are important even by international standards. Production is now ranging between 300,000 and 400,000 tons a year, with ferro-silicon accounting for about half the output. Norway is an important supplier of ferro-silicon to West Europe's steel industry.

Norway has recently also become an important exporter of the light metal magnesium. Output was 4,000 tons in 1955, 15,000 tons in 1960. By 1963 capacity was 25,000 tons, which is being further increased to 30,000 tons. Norway will then be able to supply half of West Europe's consumption of this metal and 20 per cent of the Western world's consumption as it stands at present. Largest consumer of Norway's magnesium now is the West German automobile industry.

Ninety per cent of Norway's aluminium output is also being exported. In aluminium Norway is making particularly spectacular progress. From 1953 to 1963 output leapt from 56,000 tons to 220,000 tons. Extensions in hand will give a total capacity of 300,000 tons by 1965, and new plants which are planned should raise capacity to 500,000 tons or more by 1970.

Production of copper and nickel (largely on the basis of imported ore) has doubled in the last decade and is running currently at almost 20,000 and 30,000 tons a year respectively. Output of zinc is stable at about 45,000 tons. Most of copper, nickel, and zinc output is also exported.

Characteristic creation of the 20th century is Norway's electro-chemical industry. Outstanding in this sphere is the industrial concern Norsk Hydro which was established in 1905 by Sam Eyde to exploit his and scientist Kristian Birkeland's discovery in extracting nitrogen from the atmosphere by an electric arc process.

This discovery was the basis for Norsk Hydro's rapidly growing production of nitrate of lime and other nitrogenous fertilizers. With the constant development of cheap, ample hydro-electric power in recent years it has been possible to step up production very considerably. In terms of pure nitrogen, output was 175,000 tons in 1953 and more than 300,000 tons in 1963. On this basis, Norsk Hydro has a present production of nitrate of lime and other chemical fertilizers exceeding 1.6 million tons a year.

In 1963, Norsk Hydro's sales income was 670 million kroner (£33.5 million, $94 million), with 70 per cent deriving from nitrogen products. Nitrate of lime remains the largest article, but concentrated and compounded fertilizers are growing in importance, with urea making the greatest relative progress, particularly on overseas markets. Important too are Norsk Hydro's complete fertilizers and ammonium nitrate limestone and anhydrous ammonia. Technical nitrogen products are headed by technical urea, nitrate of ammonia, nitric acid, and ammonia.

Ten years ago Norsk Hydro started its important production of polyvinylchloride—PVC—with capacity increased to about 24,000 tons as from 1964.

PVC is produced on the basis of Norsk Hydro's output of carbide. Output of calcium carbide for sale by Norwegian producers has increased markedly, from 27,000 tons in 1950 to 50,000 tons in 1963. Calcium carbide, which Norway started producing as long ago as 1899, is a material necessary for a number of chemical products, and can, like nitrate of lime, be economically produced in Norway owing to the cheap power and large resources of limestone.

Norway's production of calcium cyanamide and dicyanamide is also conducted on the basis of carbide.

Production of solvents, plasticisers, organic acids, anhydrides and vinylacetate polymers from sulphite alcohol has been developed in Norway by the large pulp and paper concern A/S Borregaard. In 1963 the sale of organic chemicals based on ethylalcohol was about 21,000 tons. Output of sulphite alcohol is at present running at about 14 million litres (3 million gallons) a year. In 1962 the production of vanillin from sulphite waste liquor was put on stream.

Norway's large pyrites deposits are the basis for a considerable production of sulphur, although sulphur output has in fact gone down from about 100,000 to 50,000 tons a year over the last decade. However, an increasing proportion is being processed to sulphuric acid.

PLASTICS

Partly on the basis of Norwegian production of materials such as PVC, polyester, and synthetic resins, Norway has developed an extensive manufacture of plastic articles for domestic and industrial use. Production ranges from buckets to boats, from buoys to baths.

PAINTS

Norway has a large production of paints and varnishes for domestic, industrial, and maritime applications. Climatic conditions in Norway and the stringent demands of the large merchant fleet operating all over the world are factors which account for the high quality of Norway paints. Most of the synthetic resins required are made in Norway, as well as zinc oxides, cuprous oxide, plasticisers and dispersions, fillers and extenders.

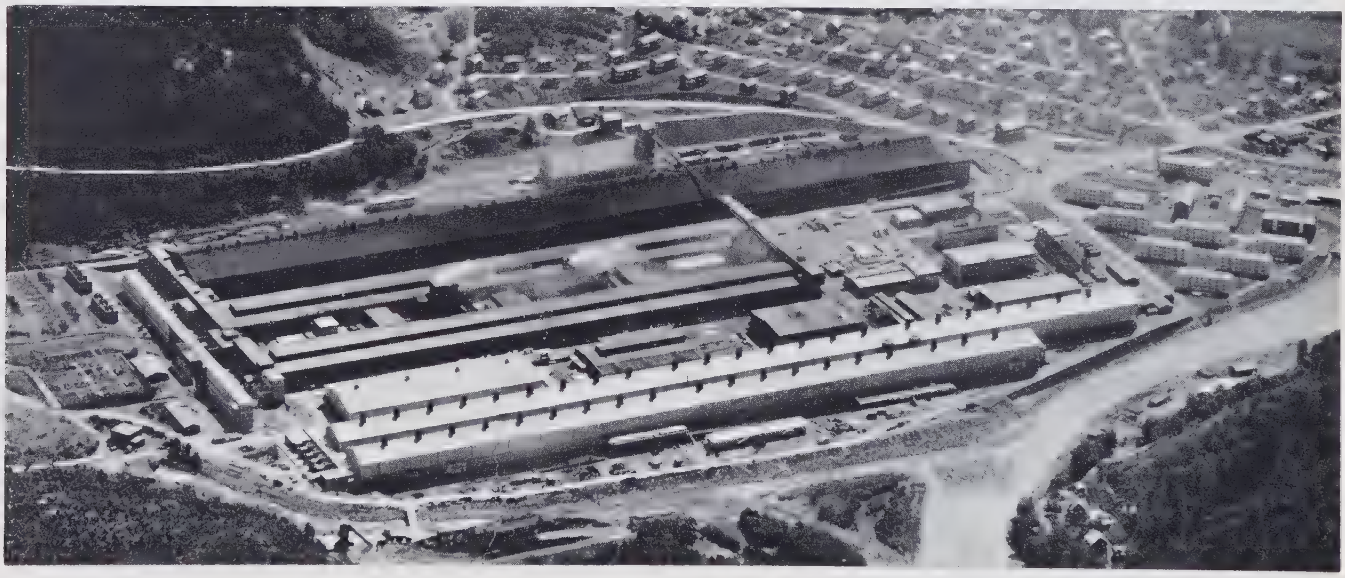
EXPLOSIVES

Established by dynamite inventor Alfred Nobel in 1865 under the name of Nitroglycerin Compagniet, Norsk Sprængstofindustri A/S has been the most important Norwegian producer of explosives for industrial and military uses for almost a century. Explosives account for about half of the company's total sales which in 1963 exceeded 110 million kroner (£5.5 million, $15.5 million).

ADHESIVES

Norsk Sprængstofindustri A/S is one of the most important producers in Northern Europe of synthetic adhesives for wood-working industries, plywood and chipboard. A considerable part of the production is exported all over the world. The company makes its own formaldehyde. Norsk Sprængstofindustri A/S also manufactures synthetic resins for the paint and varnish industry, vinyl floor tiles, and plastic film and packaging.

Aluminium plant in West Norway with capacity exceeding 100,000 tons a year.



Söderberg electrode in operation.

ELECTRIC SMELTING

In 1918, Elektrokemisk A/S, Oslo, was granted patent for the now famous Söderberg self-baking electrode. All over the world, many materials from pig iron to nickel matte are today smelted in electric furnaces with electrodes of this type. Since 1925 the Söderberg electrode has also been successfully used in the aluminium industry. Today about 60 per cent of Western aluminium output is produced in furnaces with Söderberg electrodes.

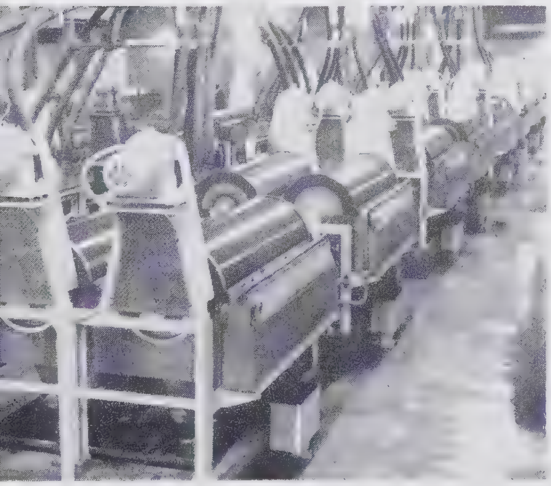
Furnaces by Elektrokemisk A/S, Oslo, are now used world-wide. Capacity of Elkem furnaces was 50,000 kW 40 years ago. Now it is about 5 million kW. Four furnaces to Kentucky, USA, have an output of more than 1,000 tons of calcium carbide a day. Even larger furnaces of 45,000 kW each have been supplied to Imperial Chemical Industries—ICI— in UK and Norsk Hydro in Norway. In Venezuela the largest electric smelting works in the world have recently started operation with nine 24,000 kW Elkem pig iron furnaces with a production capacity of 750,000 tons a year.

Iron and steel plant in North Norway.

ORES AND MINERALS

Oldest of industrial activities in Norway is mining. Silver and copper have been mined for centuries, and the ancient towns of Kongsberg and Röros have grown up around those two metals. Kongsberg became for a time Norway's second largest town, and the mining academy established there more than two centuries ago was the precursor of Norway's first university. Silver mining has now ceased, but the copper mines, in the doldrums for a time, revived in the late 19th century with the demand for sulphur which, together with copper and zinc, are found in the pyrites mined in Norway. Likewise the iron mines, which had declined with the old ironworks based on charcoal smelting, have gained a new lease of life since the beginning of the 20th century.

The Thune—Sydvaranger permanent magnetic separators for enrichment of iron ore and removal of magnetic contaminations from non-magnetic ore have won a big market in Sweden and other countries. The picture shows a recent installation of 18 separators (2 drums each) at an ore-dressing plant at Stråssa, Sweden. This plant is considered the most modern of its kind in Sweden and has to handle ore with low iron content (down to 30 %) with 80 % magnetite and 20 % hematite. The Thune separators remove the magnetite. Manufacturer is A/S Thunes Mek. Værksted, Oslo.



Today iron ore ranks first in volume and value among Norway's mining products. Output is at a record level of about 2 million tons of concentrated ore a year. Export is about 1 million tons a year.

The largest mine, worked since 1910, is situated near Kirkenes in the far north close to the Russian border. The installations were entirely destroyed during the last war, but have been rebuilt and are now yielding more than ever before.

In 1963 production was 1.5 million tons. About half of production is shipped to West Germany, large amounts to Great Britain, the remainder to Austria, Belgium, Poland and the Norwegian iron and steel plant at Mo i Rana.

The ore is a true-taconite-quartz-banded magnetite, containing 32–35 per cent iron, 27–37 per cent magnetite iron, 42–46 per cent silica, 0.04–0.05 per cent phosphorous (P) and 0.06–0.09 per cent sulphur (S). In the highly mechanized plant of A/S Sydvaranger it is converted to a concentrate with an average composition of 64.5–65 per cent iron, 7.5–8.5 per cent silica, 0.009–0.01 per cent P and 0.03 per cent S.

Most Norwegian iron ore is of the magnetite type, low in phosphorous and sulphur but also rather low in iron content, 30 to 35 per cent. The ore is concentrated by magnetic separation to yield a product with about 65 per cent iron.

Regular working of a large new mine at Rana in the Dunderland valley close to the North Norway iron and steel plant is starting in 1964. Initially production is set at about 750,000 tons a year, to be increased later to double that figure or more. The deposits are the largest in Norway, holding from 400 to 600 million tons.

Ilmenite deposits, believed to be the biggest in Europe, are mined at Tellnes in South West Norway. Output of concentrate is about 300,000 tons a year and is nearly all exported for refining into titanium oxide.

Norway's large deposits of pyrites became important in the late 19th century due to the heavy demand for sulphur and sulphuric acid. When selective flotation was introduced, copper and zinc concentrates became useful by-products. Output of pyrites is about 800,000 a year. Exports are about 500,000 tons. In Norway, pyrites retained for processing yield now about 50,000 tons of sulphur yearly. Output of copper ore and concentrate is running at almost 30,000 tons a year and output of zinc and lead concentrate is also almost 30,000 tons a year.

Limestone for cement, nitrate of lime, and other purposes, is available in ample quantity in Norway, and is mined at the rate of more than 3 million tons a year. There is some export of both limestone and the calcium mineral dolomite.

Feldspar and quartz for ceramics and other purposes are mined in considerable quantity. Quartz is also an important raw material for Norway's ferrosilicon industry.

Nepheline-syenite, which can compete with feldspar for ceramic purposes, is now being mined in Norway. The deposits are the first in Europe to be commercially exploited.

Olivine sand for furnace linings and refractories is produced and exported on a considerable scale. Export of talc and soapstone is also quite large. Norway has a substantial output of graphite which is all exported.

Stone is a commodity in rich supply, and traditionally Norway has been a large exporter of granite. Today interest centres more on the labrador syenite stone for cladding purposes, and some attractive marbles are also available. Rapidly increasing in popularity for flooring and cladding of building is also the quartzite slate from Alta and other districts of Norway.

A rapidly growing sector of Norway's mineral production and export relates to micro-minerals for use chiefly as fillers and extenders. Output is mostly micronized talc and dolomite.

Hundreds of miles north of Norway, in the archipelago of Svalbard (Spitzbergen), Norwegian mines are producing some 400,000 tons of coal yearly. This is shipped south in the short summer, whilst in winter Svalbard is ice-bound.

This is in sharp contrast to the mines in Norway, which can ship their products all the year round. Even Kirkenes in the extreme north, 250 miles beyond the Arctic Circle, is ice-free in winter as in summer. Most of the mines are in fact situated close to the sea, with excellent deep-water quay facilities.

Longyear City, Spitzbergen, where coal is mined farther north than anywhere else in the world.

One man can control operations in the large concentrator hall of A/S Sydvaranger, Kirkenes.

A/S Sydvaranger's iron ore mines at Björnevatn 200 miles north of the Arctic Circle.

TIMBER THE GROWTH STOCK

Log winch of Norwegian manufacture—an example of forest mechanization.

One hundred and fifty years ago the forests were Norway's prime wealth. In terms of sawn and planed wood, timber was Norway's largest export. Important too were the forests as a source of additional income for Norway's farmers. In the century and a half since 1814 the forests have increased rather than diminished in importance. Demand from the sawmills is still healthy, but also there is the almost insatiable demand of the pulp industry. Today, recognizing the potential of this natural resource, an unprecedented effort is being made to extend and improve the forests to ensure an even bigger timber harvest for the generations to come.

A quarter of the surface of Norway is forest which provides the raw material for the wood processing industries which in turn account for almost a quarter of Norway's total exports.

The forests have long been a source of wealth, indeed a means of survival. The forests have provided wood for fuel, timber for homes, ever since man settled in Norway. A tree trunk was the first boat, later to evolve into the elegant longships of the Vikings and the trading barques of the Middle Ages. It was around the 16th century that Norway's prosperous timber export started and the foundations laid for a class of merchants and shipowners who developed worldwide commercial interests.

The forests have increased rather than declined in importance with the years. The pulp and paper mills have enhanced the value of the timber, and the manufacture of rayon and other forms of exploitation of wood have also helped to boost the worth of each tree that is felled.

Although there is some import of logs, the growth of the wood processing industries is basically limited by the availability of wood from Norway's own forests. Therefore, particularly since 1945, intensive efforts have been made to expand the forests by more planting and improve the yield by better cultivation. In the last few years the number of trees planted has exceeded 100 million annually compared with 20 million in the last pre-war year.

The new forest plantations are being established not only in the traditional forest areas of East and Central Norway but also in the more exposed areas of West and North Norway. Impressive results have been achieved in these areas since the war in cladding the bare mountainsides. The new forests which are being established there will yield valuable timber in years to come, but also important is their function of protecting the soil against erosion and providing shelter for neighbouring agricultural land.

Thousands of acres of new forest are being planted annually, and the quality as well as the quantity of planting is being raised. It is significant for instance that the distance between saplings has been increased on average from 3 to 6 ft. The saplings are being planted with fresh rich soil around their roots, and with chemical fertilizers added either at the time of planting or a year or two later to ensure rapid strong growth in order to compete with weeds and undergrowth.

Experiments are also being made with planting out of saplings in peat pots which avoid disturbance of roots.

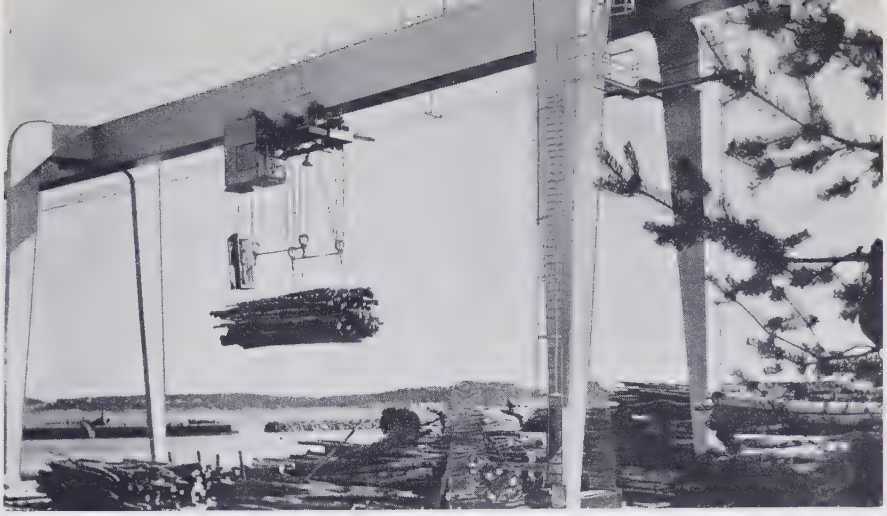
The saplings themselves are also improved in quality, due to better selection

New plantations are being planted on an unprecedented scale, and existing forests are yielding more through improved cultivation.

A tree nursery in Norway. In 1963 nurseries had 150 million saplings ready for planting out.

Logs are floated to the mills down rivers, across lakes, and even by sea round the coast.

In forestry as in agriculture, more and more mechanical aids of Norwegian manufacture are being employed. Production includes excavators and ditchers, winches and power saws.



Munck box crane for timber handling.

Jo-Bu—the motor chain saw from Norway with world sales.

Excavator by Brumunddal Mek. Verksted with rock grab which also can be used as log loader.

2-drum tractor winch by Ludvik Isachsen Mek. Verksted.

of stock and due to such technical advances as the installation of refrigeration stores at all major nurseries.

The types of trees most planted are common spruce (P. abies) with about 80 per cent of the total and common pine (P. silvestris) with about 10 per cent. The remaining 10 per cent consists of various foreign species, in particular Sitka spruce (P. sitchensis).

Of Norway's 300,000 sq. km (115,000 sq. miles), 60,000 sq. km are productive forests. Present afforestation plans embrace an area of about 12,000 sq. km, of which almost half in the West and North. The progress made so far indicates that this area will be fully planted in 20 to 25 years.

Surveys of Norwegian forests show already a considerable increase in the annual increment, partly due to a certain improvement in the climate but chiefly due to improvements in forest culture. In the last quarter of a century the annual increment in the coniferous forests has increased by more than 20 per cent. The total increment according to the latest estimates is about 13 million cubic metres (17 million cubic yards) a year, of which about 11 million cubic metres coniferous and about 2 million deciduous.

Taking into account inaccessible forest tracts and losses of various kinds, there is a net figure of about 10 million cubic metres which can be cut each year. In fact the total annual cut is running at about this level, with about 9 million cubic metres coniferous timber and the remainder deciduous. The deciduous wood is mostly birch, which is in increasing demand for industrial processing, particularly by wallboard and chipboard mills.

Some 2 million of the 10 million cubic metres annual cut is retained on the farms for fuel, fencing, and other purposes, so that the amount of round-wood for sale to sawmills and industrial processers is around 8 million cubic metres.

It would obviously be desirable to increase this amount, and the forest extensions and improvements which are being made will gradually make more timber available. In light of the work being done and the possibilities which exist, the Forestry Commission estimates that in the course of 70 to 100 years the annual increment can be increased to more than 24 million cubic metres compared with the present 13 million cubic metres.

This is a long-term investment, but already the fruits are beginning to be seen. Ditching and draining are helping to reclaim bog and wasteland for afforestation. Bare slopes are being clad. Forest land is being fertilized and enriched. Hundreds of miles of forest road are being built annually to ease and speed access. Transport is being motorized by truck and tractor. Mechanical winches and overhead transport lines are being increasingly used. Power chain saws are almost universally used to speed the felling. More and more trained men are entering forestry, and research and advisory services are being strengthened.

The results to date are all the more remarkable in view of the fact that much of Norway's forest land is split up into small holdings owned by individual farmers. Of 125,000 forest holdings in all, most are small plots of up to 25 acres only. For Norway's small farmers, and for the prosperity of the countryside generally, it is obviously important that the forest holdings are being extended and improved to provide a good and growing income for the nation's rural community.

PULP AND PAPER

Principal of Norway's natural resources for many centuries, the forest timber was the prime export 150 years ago, but then in the form of sawn and planed wood. There were no pulp mills, and only a few paper mills with a small output based exclusively on rags, not wood pulp. It was in 1863 that the first wood pulp mill was established near Oslo on the Akers river. It was in fact there that the first paper mill also was established, right back in 1695. Neither exists today, but the pioneer seed has given birth to a great pulp and paper industry which ranks among the very chief props of Norway's economy.

Most of the present pulp and paper mills were established more than half a century ago. There has been some reduction in the number of mills and concentration of units since then, and very few new mills have been established during recent decades. But there has been consistent attention to technical improvement, with constant modernization as well as extension of existing mills.

Norway now has 40 mechanical pulp mills compared with 72 a half century ago, but the present mills have a considerably larger capacity, with a total output of 780,000 tons in the best year so far, 1960. Over the same period the number of chemical pulp mills has gone down from 27 to 21, but output per mill is 3 times as large on average, totalling 736,000 tons in 1960 for the chemical pulp industry as a whole.

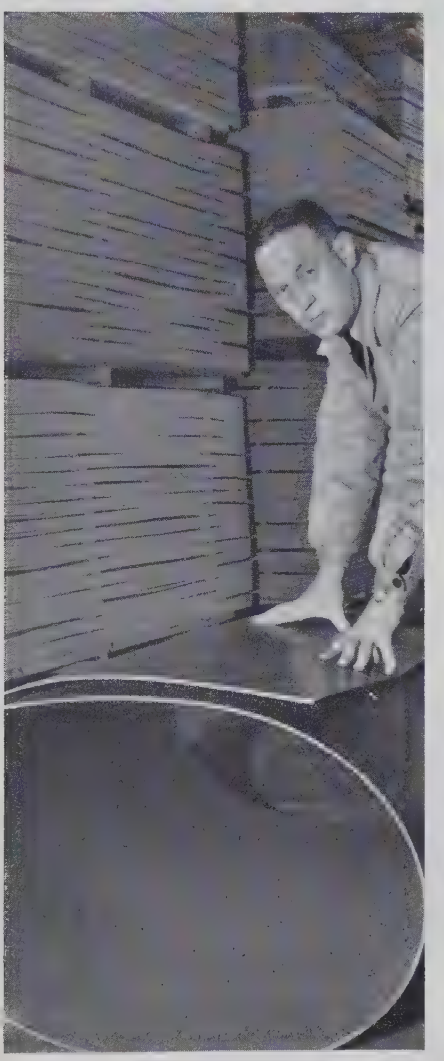
Over the last half century the number of paper mills has increased slightly, from 46 to 48, and combined output has increased 3½ times to some 880,000 tons.

Sixty per cent of mechanical pulp and 40 per cent of chemical pulp are still being exported, but the Norwegian paper mills are expanding and therefore taking a larger proportion of the available pulp. In 1963 two large new paper machines were started up with a combined annual production of 140,000 tons of paper and board.

The Norwegian market is taking about 40 per cent of the paper and board production, so that the proportion exported is about 60 per cent.

Exports of paper and board have recently been running at about 700 million kroner (£35 million, $98 million) a year, and pulp exports at about 500 million

Wallboard—a versatile material.



From a Norwegian pulp mill.

kroner (£25 million, $70 million). Together they account for about a fifth of Norway's total commodity exports.

In addition, there are a number of other export products which derive from Norway's forests, ranging from pit props to rayon yarn. In total, the value of exports of forest products of all kinds and with various degrees of processing is near a quarter of Norway's total exports.

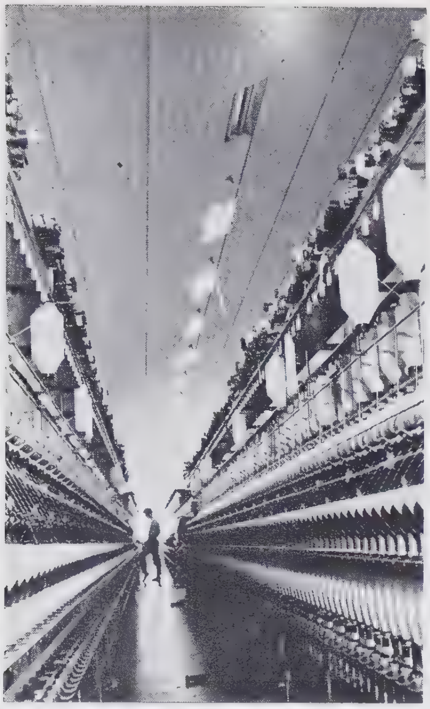
Because the raw material supply from Norway's own forests is relatively limited in the short run, the progress in terms of production and export value has been achieved principally through an increasing degree of processing. An obvious example is the growing proportion of pulp production which is being retained for conversion to paper by Norway's own mills. But also within the pulp and paper sectors, more advanced and valuable grades are being produced, with the emphasis always on raising quality.

Important too is the production of rayon fibre and yarn from chemical pulp and the extraction of chemicals from the chemical pulp waste alcohol.

Also significant is the rise of the wallboard and chipboard industries which have a combined output now of about 175,000 tons a year. It is particularly valuable that these industries can absorb types and sizes of wood which formerly were unsuitable for industrial exploitation.

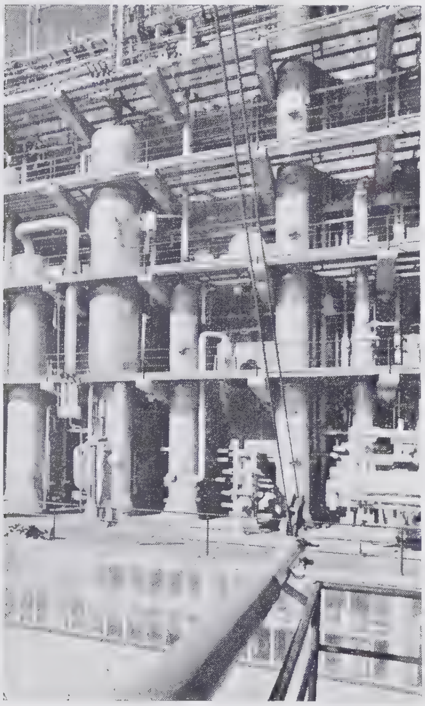
The pulp mills too are developing methods for making increasing use of pine and deciduous wood such as birch. Whilst demand for spruce has exceeded the home supply, demand for pine has been substantially less than supply, but several mills are now stepping up the intake of pine substantially, and also of deciduous wood. One large mill is now making its fine paper grades from pulp made exclusively of birch and pine, whilst formerly only spruce was used for these grades.

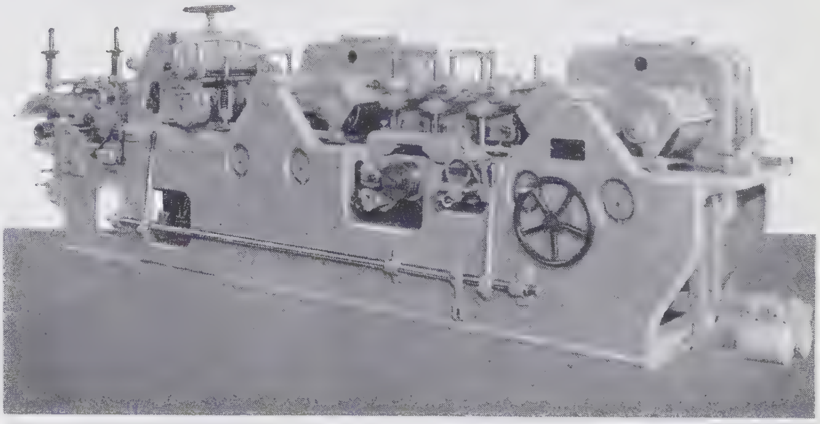
Increasing attention is also being paid to making economic use of waste materials such as bark. An increasing proportion of logs are now being barked at the mills and its is estimated that the amount of bark deriving from the trees felled each year is as much as 900,000 cubic metres. Efficient methods for using the bark for fuel and other purposes are being studied.

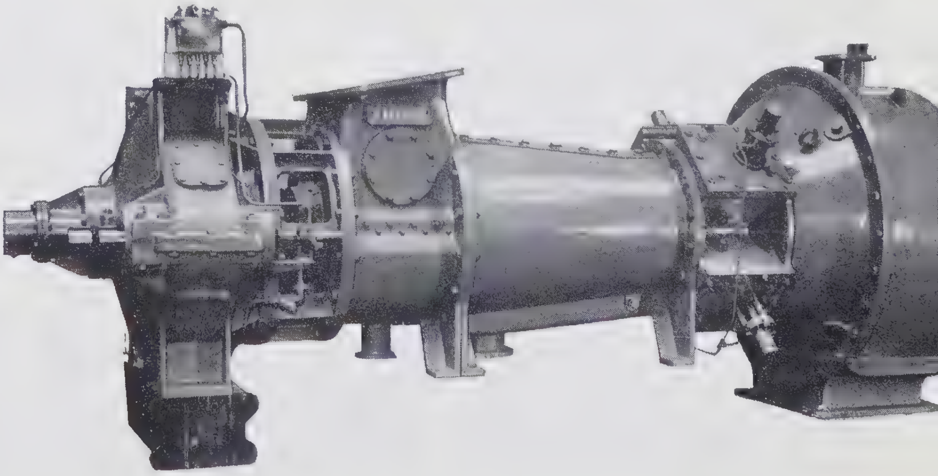


A/S Borregaard's rayon mill.

A/S Borregaard's vinyl plant.



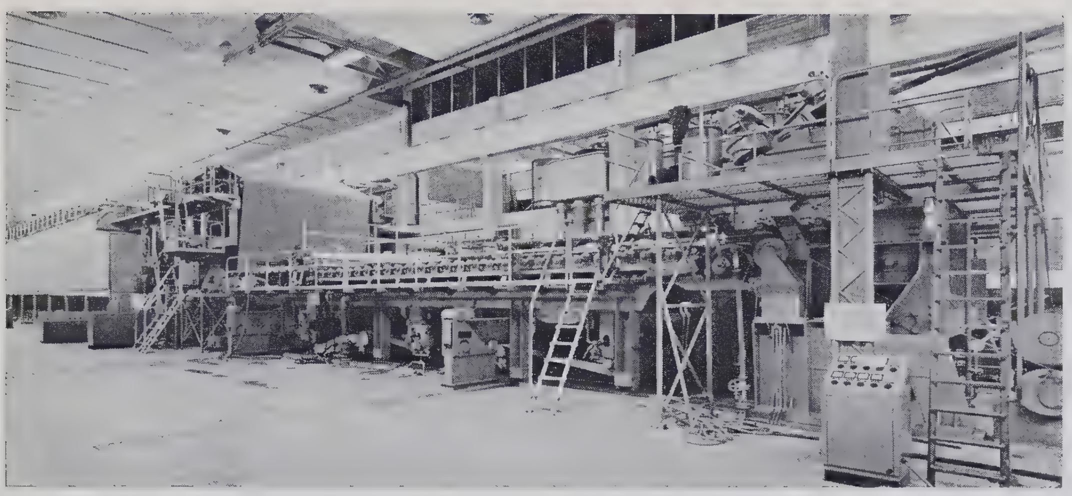




Above right: Wood planing mill by J. & A. Jensen & Dahl (JAJOD) A/S.

Right: Centrifugal press for chemical pulp, manufactured and exported by A/S Thunes Mek. Værksted.

Saugbrugsforeningen's paper mill at Halden, S.E. Norway, produces 125,000 tons of high grade paper and board annually.



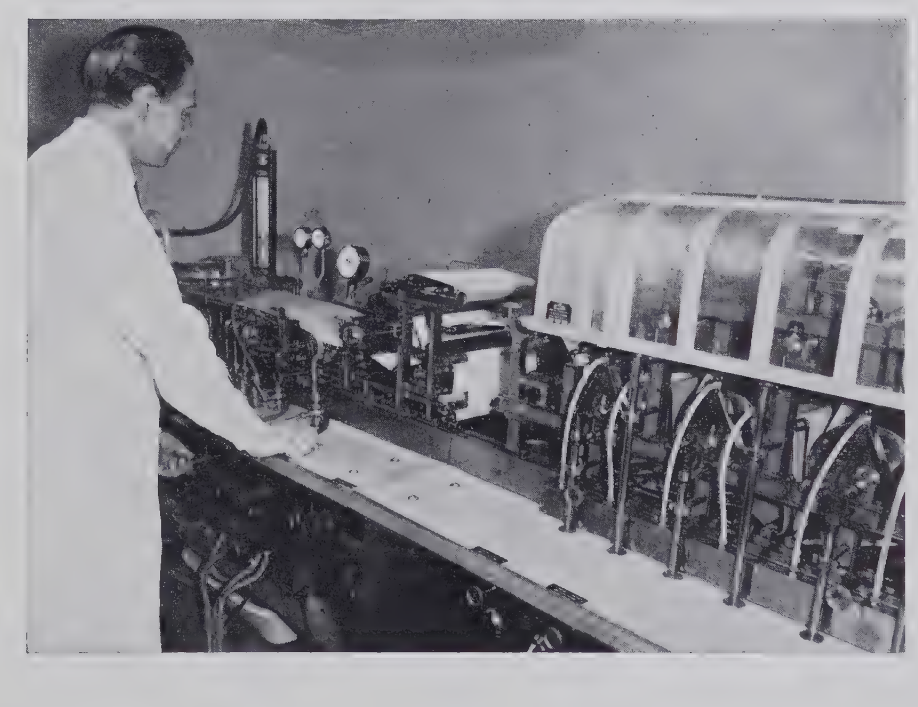
Saugbrugsforeningen's new paper mill is button-operated.

RESEARCH

Established 40 years ago and now housed in its own new spacious building at Vinderen, Oslo, the Norwegian Pulp and Paper Research Institute is contributing importantly to upholding and advancing the quality standards of Norway's pulp and paper industry. The staff of about 100 are working in departments concerned with mechanical pulp, chemical pulp, paper, and fibre-board. There is also a workshop where special equipment can be made as required.

The Institute is concerned with both applied and fundamental research. In the first field, the Institute investigates and solves problems of immediate interest to the industry, and «trouble shooting» and routine control analysis are also undertaken. This work is mostly carried out on contract basis and the results become the property of the contracting firms. However, the Institute is dedicated principally to the solution of problems of more fundamental nature, and the results, which are published, are usually of general international interest.

This accurate working model of a paper machine is installed at the Norwegian Pulp and Paper Research Institute in Oslo. Every stage of pulp and paper production can be carried out in miniature at this Institute.



THE STONY LAND

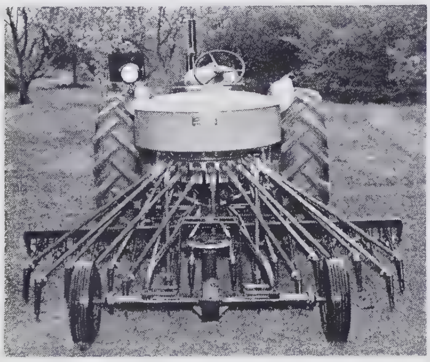
Special equipment is made to remove boulders.

Norwegian ploughs win international contests.

In 1814 Norway was largely an agricultural country, with remote farms and holdings wresting a meagre living from the land. Forestry provided a useful supplement to income, and likewise fishing in coastal districts. Not rich in worldly goods, the peasants of Norway nevertheless were the nation's backbone, not only predominant in number but staunchest in preserving the traditional culture. Deep in valleys, high on hills, they were farthest from alien influence and closest to ancient native arts. Centuries of foreign domination could whittle away little if any of their independent spirit and self-sufficiency.

Underhaug potato planter.

Stokland seed drill.



Throughout Norway, farms and smallholdings are still scattered, nestled deep in valleys, perched high on hills, lying exposed on island and shore close to the ocean.

Gradually the agricultural population is diminishing, not necessarily because the living is poor and hard, but because the 20th century, particularly the 50's and 60's, is the century of opportunity. Industry and engineering, trade and shipping, offer securer and perhaps more profitable and interesting employment, especially for young people whose horizons have widened immensely.

Geographical factors must always limit severely the scope of Norwegian agriculture. Half the surface of the country lies above the tree line where nothing grows except the occasional freak birch and the eternal ling. Most of the rest of Norway is also rock thinly covered with soil. Only about 5 per cent of the country can be cultivated.

Norway, a northern country, extends hundreds of miles beyond the Arctic Circle. Even in the 5 per cent of the country where the plough can dig fairly deep, the soil can grow only a restricted range of crops. Most of the 5 per cent is meadow, and grass is the principal crop. Next in importance are grain, potatoes, and a few other root crops and vegetables. The grain is chiefly barley and oats. Wheat is rare and difficult in the Norwegian climate. Fruit trees and bushes flourish.

In spite of its problems and handicaps, Norwegian agriculture is not a dismal tale. Indeed it is the story of success in the face of adversity. True, the labour force has dropped by more than a third since 1939 when world war II broke out. Today agriculture employs not more than 12 per cent of the total working force.

For a nation enjoying full employment, this decline in employment is not necessarily regrettable, especially when it has been accompanied by a steady increase in production. In the decade 1950-59, agricultural output increased 18 per cent in volume. Crop output increased 15 per cent, animal products output increased 20 per cent.

Mechanization and rationalization are behind this remarkable achievement in the teeth of falling manpower. The loss of men has been compensated by the gain of machines. Tractors numbered 3,000 in 1939. In 1963 there were 80,000. The number of harvesters, excavators, and bulldozers has also increased spectacularly.

The size of farms and holdings—they are mostly small in Norway—is being slowly but steadily increased, to gain maximum advantage from modern machines and methods. Grants are being given to encourage reclamation of land to add to the size of existing farms. Legislation has been passed to prevent further division of farms and to facilitate amalgamation of holdings.

Specialization is being encouraged, although still only about a third of Norway's 200,000 farmers with more than 5 decares of land have farming as their sole occupation.

Norway's farmers carry a heavy responsibility. According to government policy they should supply the nation's total requirements of milk, butter, and cheese, also meat. They should also supply most of the requirement of fruit and vegetables, and a large part of the national grain requirement, in particular for coarse grains.

These policy aims are in fact being fulfilled. In the dairy products sector, there is a milk surplus which is being exported in the form of butter and cheese. The milk surplus was 200 million litres in 1963.

Production of fruit and vegetables covers the greater part of Norway's requirements. Grain production covers a large part of agriculture's requirement for coarse grains. On the other hand, most of wheat grain is imported. Research institutes in Norway are working on the problem of developing wheat categories which are appropriate for northern conditions and modern harvesting techniques.

Working in support of Norway's agricultural community generally are the training and research institutions and public advisory services. Also promoting the welfare of country people are the public measures to spread the electricity supply and improve the water supply. In 1946, 160,000 households were without mains water. By 1960, two-thirds of those households had received grants for installation of mains water. Mains electricity has by now been provided to more than 99 per cent of Norway's population, and for country dwellers this too is a blessing of inestimable value.

Buckrake with adjustable tines, manufactured by Kværnelands Fabrikk A/S and sold in a dozen countries.

Farms nestle deep between mountains.

PRODUCE

Norwegians are believed to consume more milk and cheese per capita than any other nation. Not surprisingly, dairy products account for a major part of Norwegian farmers' income. In spite of the heavy consumption in Norway, there are dairy products to spare for export. In 1963 exports were 4,000 tons of butter and 14,000 tons of cheese, earning altogether 78 million kroner (£3.9 million, $11 million). Sales, including exports, are by the cooperative marketing organization Norske Meieriers Salgssentral, Oslo. Main cheeses exported are Gouda, Blue, Edam, Tilsit, and rindless Cheddar and Cheshire. Norwegian specialities are the spiced Nökkel cheese and the brown cheese made from a blend of goat's and cow's milk. Cheese spreads from Norway under the Primula trademark have won an international sale and are also being made in subsidiary factories in Sweden, Denmark, and UK.

Norges Kjött- og Fleskesentral, Oslo, is the cooperative marketing organization for meat in Norway, with more than 120,000 affiliated producers. Meat production is about 130,000 tons, mainly pork and beef. Exports are only a few thousand tons a year but are tending to grow. Norway is the only European country apart from Ireland which is permitted to export meat, including pork, to USA where veterinary regulations are particularly strict. In Norway there has been no foot and mouth disease for very many years and health conditions generally satisfy the stringent US requirements.

Eggs are marketed through Norske Eggcentraler S/L, Oslo, with 30,000 producer members, and by Eggrossistenes Landsforening, Oslo. Output is about 50 million dozen eggs a year, and about 2 million dozen are exported.

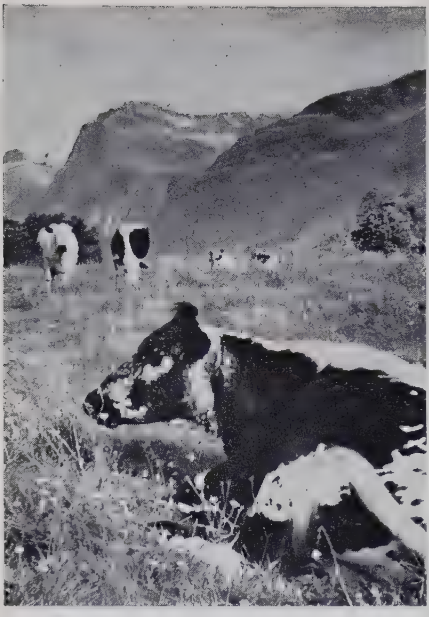
Potatoes are by far the largest vegetable crop, exceeding a million tons a year. Seed potatoes are a small but developing export. For several years Climate and soil in Norway are con- shipments have gone to South Africa. sidered particularly good for cultivation of high quality seed potatoes. There is complete absence of serious virus diseases, and the Colorado beetle is no problem. Main potato varieties are Kerr's Pink, Ås, Parnassia, King George, Arran Pilot, Early Puritan, Prestkvern, and Jössing. Exports are by Gartnerhallen, Oslo, which handles vegetable and fruit sales for some 10,000 producers.

Norway has a substantial crop of apples and pears, plums and cherries, and there is a small regular export to Sweden. Cultivated blackcurrants are exported in the form of juice, and there is also demand abroad for Norway's wild bilberries and cranberries. Generally, fruit ripens later in Norway than elsewhere in Europe, and there is a possibility that for instance strawberries from Norway will win a market abroad.

PRODUCTION 1963:

Hay	2,800,000 tons
Grain	635,000 tons
Potatoes	1,200,000 tons
Vegetables	150,000 tons
Fruit	120,000 tons
Milk	355 m. gallons
Meat	130,000 tons
Eggs	31,000 tons
Wool	4,500 tons
Mink	1,300,000 pelts

In a few lowland districts, conditions for agriculture are more favourable.



Cows feed on lush pasture.

Norwegian sheep yield a warm, strong wool.

Modern pig farm fitted with showers.

EQUIPMENT

Norway has developed a considerable manufacture of agricultural equipment designed to work satisfactorily in difficult conditions. Some of this equipment is also winning export markets. One large manufacturer is exporting half its output, shipping abroad not only complete units but also parts for assembly in a number of countries. Some of this company's equipment is also being manufactured on licence abroad. Main items are the Hydrein mounted plough, the Höysvans hay sweep, the Silosvans buckrake, the Skålsvans disc harrows, and the Fjörsvans springtooth harrows.

A subsidiary company is manufacturing the highly successful Stokland seed drill. Output is now several thousand units a year with half of output going abroad. A fertilizer distributor is also in production.

Another manufacturer is specializing in tractor-mounted implements for cultivation of potatoes and other vegetables, with much of output going to Sweden. This company is also noted for its production of the giant Skjærpe ploughs and rakes for clearing land for new cultivation. These are designed for attachment to bulldozers and are very robustly built for removal of large boulders and tree-stumps.

Tractor-mounted ploughs by another manufacturer have found a considerable market abroad.

FURS A BIG EXPORT

Norwegian fur exports, worth about 150 million kroner (£7.5 million, $21 million) in 1963, are expected to reach a new record level in 1964. Ninety per cent of output is mink, with mink pelts now exceeding a million a year. Almost the entire production is exported, with USA the principal market and West Germany and Italy also important buyers. About 100,000 blue fox pelts are also produced, and here too USA is the main market.

Mink and blue fox from Norway are internationally advertised under the Saga label. Saga pelts are marketed through Oslo Fur Auctions Ltd., Oslo, which holds auctions attended by buyers from all over the world.

Cheese from Norway is a considerable export.

SEA HARVEST

Since man first settled on Norway's rocky shore, the sea has been a bountiful provider. A century and a half ago, the fisheries were a pillar of the economy. Not that the fisheries then, any more than now, were a sure or safe living. The men who ventured with net and line to haul the fish from the sea were pawns in the fickle hand of nature. Unorganized, they were not in a position to bargain strongly with the merchants either. Since then, the fishermen have gained in technical efficiency and organizational strength, so that their economic condition has improved out of all recognition compared with 1814.

This century has seen a very substantial increase in Norway's fishing catch. In the decade 1910-19 landings averaged 600,000 tons a year. In the decade 1950-59 they averaged 1.6 million tons. But even today, with modern boats and equipment, Norway's fish catch can fluctuate considerably. In the best year, 1956, landings were 2 million tons. Two years later landed weight was 1.2 million tons, and in the two most recent years, 1962 and 1963, landings have only been 1.1 million tons.

Most drastic has been the fall in the herring haul—1.4 million tons in 1956, only 600,000 tons in 1958. The important winter herring fisheries just off the west coast have been particularly hard hit. The winter cod fisheries off the Lofoten Islands in North Norway have also disappointed in recent years.

To counter the decline in Norway's two main seasonal coastal fisheries, participation has increased in other fisheries. Fishermen are going farther afield in search of fish and are operating more on an all-year-round instead of a seasonal basis. More Norwegian fishermen are engaging in trawl fishing, and they are also participating, with a variety of vessels large and small, in ocean fishing off Bear Island, Spitzbergen, Faeroes, Iceland, Shetlands, Greenland, and Newfoundland. Particularly the participation in the North Sea and Iceland herring fisheries has increased substantially.

The trend to more mid-water and deep-water fishing is involving a development towards larger fishing vessels. At present the great majority of fishing vessels are small wooden craft. According to the 1960 census there were altogether 36,000 fishing vessels and 6,000 auxiliary boats. Only 400 were steel vessels, 11,000 were decked wooden vessels, and 24,000 were open motorboats under 30 ft. The authorities are encouraging the scrapping of old vessels and the building of sea-going craft over 60 ft. There are now 37 large trawlers (vessels over 300 tons) and 400 small trawlers. Ten of the new-type stern trawlers have been built and more are under construction.

With fishermen venturing farther afield and investing in bigger boats and more expensive equipment and operating on all-year basis, fishing is becoming more specialized, more professional. Consequently the number of men with fishing as their sole or main occupation has gone down appreciably. They numbered 70,000 in 1950 and only 50,000 in 1960, and this trend is still continuing.

SEALING AND WHALING

Norway was the pioneer of Antarctic whaling using factory ships independent of shore stations. For many years Norway sent the largest number of expeditions and brought back hundreds of thousands of tons of whale oil for refining to margarine and other purposes. Today, Norway's share of Antarctic whaling is dwindling and a number of factory ships have been sold to Japan.

A fleet of Norwegian sealing vessels sets off each year to Arctic waters and brings back some 200,000 pelts which are in good demand for sealskin coats and other articles.

Hundreds of vessels gather for the herring and cod fisheries just off the coast.

In support of its fishermen, Norway is providing training schools and research establishments. Particular attention is being paid to developing and testing new types of medium-sized stern trawlers which can help to ensure larger and more regular supplies of fish to the many processing plants ashore.

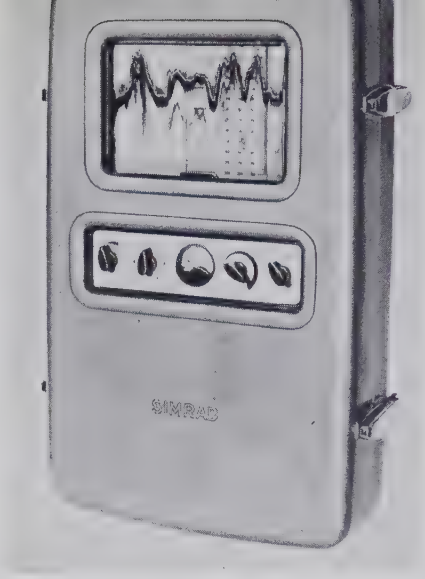
The freezing and filleting plants especially are finding an expanding market abroad. Export of frozen fish fillets was 16,000 tons in 1956, 26,000 tons in 1960. In 1963 the export was 50,000 tons.

Norway's important fish canning industry is also enjoying a sustained demand abroad for its products, headed by brisling and sild sardines.

The traditional export of dried and salted cod (stockfish and klipfish) to Nigeria, Brazil and other tropical and sub-tropical markets has declined somewhat in recent years, although shipments in 1963 were as much as 60,000 tons earning 270 million kroner.

The production of herring meal and oil has fluctuated with the catch of herring, and the export price has suffered due to increased South American production.

Generally, however, world demand for fish and fish products remains heavy, and Norway is in a better position than most to satisfy that demand. Norway ranks presently as 6th largest among world fish producers. Quality is exceptionally high. Most of the fish is still caught close to shore and can be rushed to the processing plants in a few hours with minimum deterioration. The cold climate and the strict government regulations also help to ensure that the fish which Norway offers the world is of the best possible quality.



Simrad «Skipper» Sounder, the most popular in the range of fish-finding sounders by Simonsen Radio A/S.

FISHING EQUIPMENT

Norway with one of the world's biggest fishing fleets has an important output not only of boats but also of the many items of equipment which fishermen need for maximum catches.

Echo sounders and sonar (asdic) for fish detection are manufactured and exported world-wide by Simonsen Radio A/S, Oslo. More than half of output is exported, and 250 service stations embrace the globe. In UK sales are by Decca. Twentyone nations have chosen Simrad fish locating devices for their research vessels, and Simonsen Radio A/S also manufactures special research sonar for scientific purposes. Recently the contract was secured for a research sonar for a US Government vessel. This unit will be the largest and most advanced of its kind in the world.

With a number of different fisheries, Norway produces a variety of fishing gear—trawls, nets, seines, lines, mostly now in long-lasting synthetic materials. A large number of manufacturers have recently formed export groups.

Important is the Norwegian production and export of plastic fishing net floats, rings, and buoys.

Key brand fish hooks for commercial and sports fishing of all kinds are a famed manufacture by O. Mustad & Sön, Oslo, with world sales.

Obviously such marine equipment as hydraulic deck machines, steering gear, and controllable pitch propellers, which are Norwegian specialities, are in demand for fishing boats as well as merchant ships. Diesel and semi-diesel engines of Norwegian manufacture are also in demand for fishing vessels, likewise radio-telephones and allied equipment.

Important is the design and manufacture of fish processing plant, in particular meal and oil reduction plant but also fish canning and refrigeration plant. Fish processing plant is being exported to a number of countries.

Using large, costly purse-seines, more than a hundred tons of herrings can be caught in a single cast.

Cod hangs to dry before export to tropical markets.

Canned brisling and sild sardines are a Norwegian speciality.

MARINE PRODUCTS

Dried fish, mostly cod, has been a Norwegian export for centuries, indeed back to Viking times. Under the designation stockfish, it is still an important export, going chiefly to West Africa and Italy. The fish is decapitated and gutted and washed and then hung for 6 to 12 weeks to dry in the crisp cold air. The protein content of stockfish is about 80 per cent.

Klipfish is another important Norwegian fish export going mainly to Brazil and Portugal. This is cod which has been salted before drying. Artificial drying has been adopted to some extent, but most klipfish is still spread on rocks and exposed to sun and wind to dry naturally over a period of a month or so.

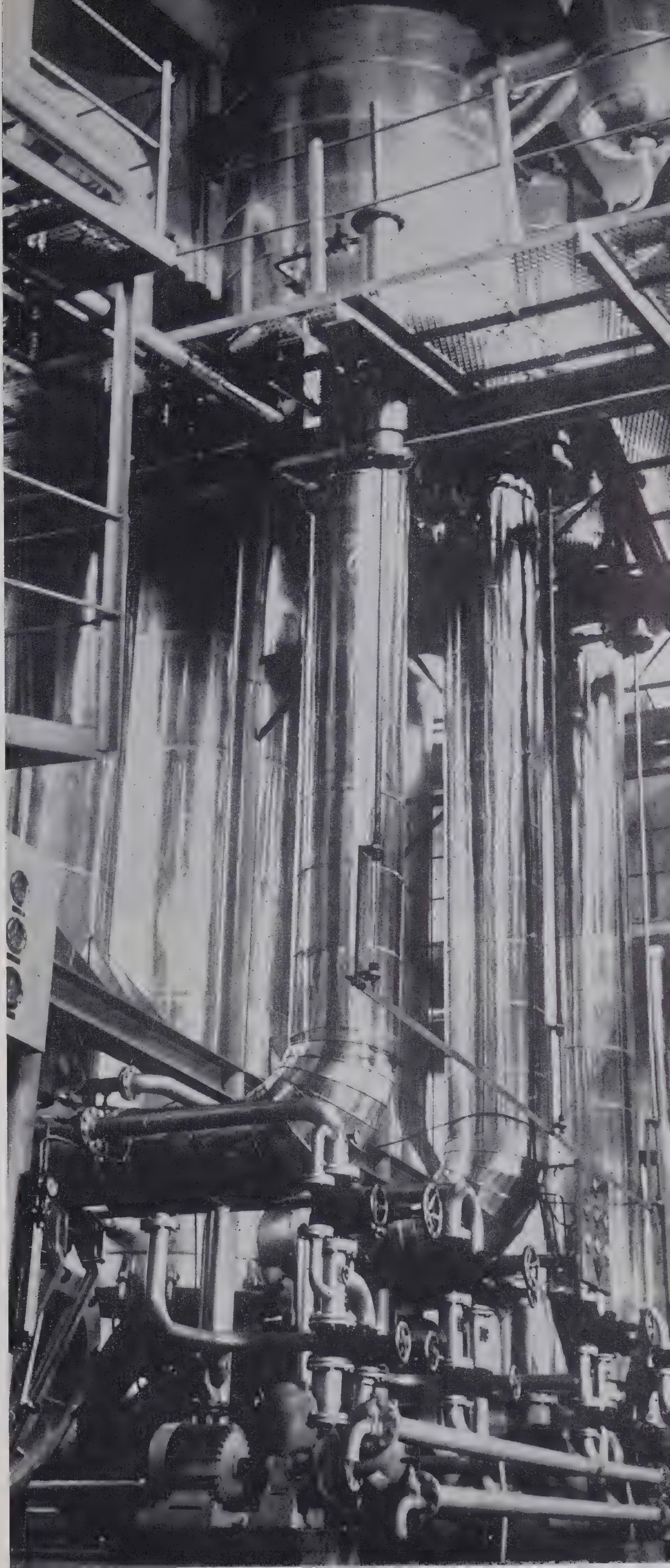
Canned fish from Norway goes all over the world, with USA, UK, Canada, and Australia the principal markets. Sild (small herring) and brisling sardines in oil and tomato account for about two-thirds of total canned fish exports. Important too are kippers, mackerel, roes, shrimps, and various delicatessen items such as herring tidbits and Norwegian specialities as fishballs and puddings.

Centre of the canning industry is Stavanger where are situated the Research Laboratory of the Canning Industry, the Official Quality Control Institute for Canned Fish Products, and the Canning School. Quality is high and consistent and backed by stringent regulations and standards enforced by law.

Rapidly growing more important is the export of frozen fish products. The cooperative marketing organization Frionor, Oslo, exported 42,000 tons—mostly fillets—in the year ending June 1963 with USA and West Europe the main markets. More than 90 freezing plants sell through Frionor, and as the plants are situated close to the fishing grounds, the raw fish is delivered only a few hours after being caught and is frozen with minimum delay to yield a first-class product.

Famous throughout the world, Norwegian medicinal cod liver oil, rich in vitamins A and D, has long been known for its health-giving properties. Modern research shows that cod liver oil is an easily assimilated fat which does not cause chloresterol in the blood and indeed reduces the chloresterol already in the blood. There is Government control of all medicinal cod liver oil which is exported.

Norway has long been an important producer and exporter of fish meal and oil. The fish meal is in demand for animal fodder and the oil is refined and processed. Export of meal for animal fodder was 106,000 tons in 1963. Export of marine oils was 56,000 tons and of hardened oil and fat 87,000 tons.



◀ **The large herring haul is to a considerable extent processed into meal and oil.** ▶

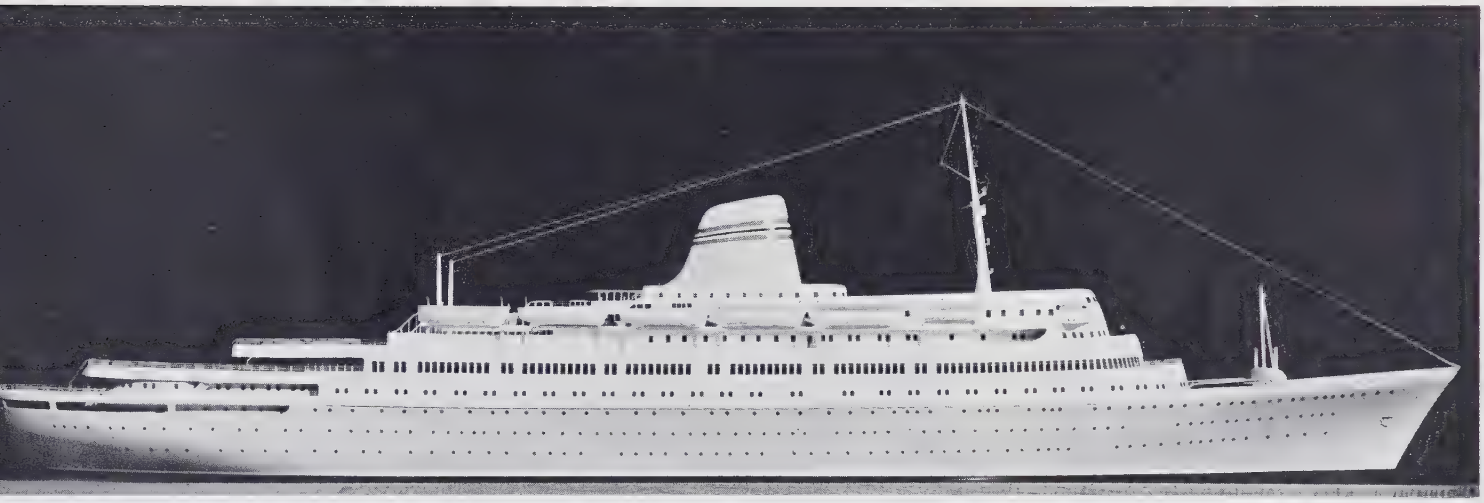
SAILING WORLD-WIDE

Not an island, but sea-enveloped in north, west, and south, with its long shore penetrated by fjords and surrounded by islands, Norway has always looked out across the water, and the men of Norway early embarked on their first expeditions to remote places. With the sea on their door-step, with water often an easier road to travel than land along the far-flung, riven coast, with fishing a vital livelihood, Norwegians early developed the expertise of sailing and navigation. As sea-fighters Norway's Vikings were renowned and feared.
A thousand years later, in the 19th century, a new important chapter opened, the chapter where Norway built and operated ships world-wide in the peaceful service of international commerce.

Today Norway's merchant fleet ranks third largest in the world, surpassed only by the fleets of USA and UK. The thousands of ships under the Norwegian flag which ply world-wide are Norwegian owned and operated and manned, and are in quite a different category from the ships sailing under flags of convenience. Norwegian shipowners are heavily taxed according to Norwegian law and must also conform to all other aspects of rigorous Norwegian legislation. No subsidies, no forms of special protection or support, are extended to Norwegian ships. On the contrary, they are exposed to the flag discrimination which a number of countries are practising in order to try to maintain or build up fleets of their own.

It is against this somewhat bleak background that Norway continues to own and operate one of the world's largest merchant fleets. Many factors can account for the success of Norwegian shipping. The key, of course, is competitive and efficient transportation, and this in turn is the product of an amalgam of qualities ranging from the technical and business acumen of shipowners to the built-in experience and skill of the sailors who man the ships.

It was the repeal of the UK Navigation Acts in mid-19th century that gave Norway the chance to sell internationally its special aptitude for sea freighting. But the rapid transition from wood to iron and steel, from sail to steam and from steam to diesel, presented a series of challenges right through the 19th century and into the 20th. With only limited shipbuilding and engineering resources of its own, Norway was not in the best position to compete technically, or indeed financially, with the merchant marines of the large industrial and commercial powers.



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The problems were overcome, and indeed Norwegian shipowners have won note for their vision and vigour in adopting new types of tonnage, new types of equipment. This is reflected in the very low average age of Norwegian ships, with 70 per cent of the total tonnage under 10 years old, and 40 per cent under 5 years old. A youthful fleet, fast and efficient, and up to the minute technically, the Norwegian merchant marine is a worthy ambassador wherever it sails the world over.

Not only technically, but also in terms of types of cargo carried, Norwegian shipowners have shown alertness in providing vessels specially adapted and evolved to meet new freight requirements. Today half the tonnage consists of tankers, and a large new category of bulk carriers is also being developed. More specialized tonnage for liquid gas, for automobiles, for newsprint rolls and other particular purposes is being built.

By keeping abreast and preferably ahead of technical developments and new and changing carriage requirements, Norway has continued to find employment for a large merchant fleet on the international freight market. In fact, 90 per cent of Norwegian tonnage operates between ports abroad.

Viking ship preserved in Oslo.

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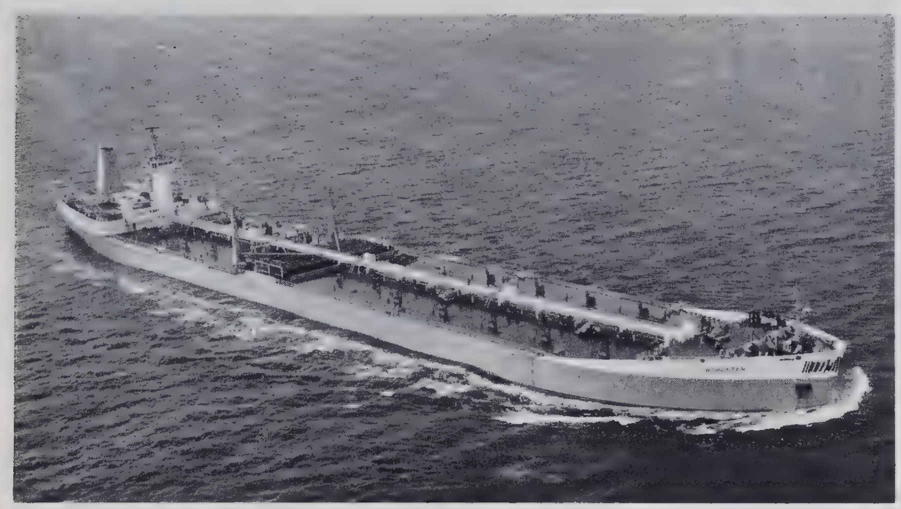


① Model of the new transatlantic liner Sagafjord launched this year in France for the Norwegian-America Line. Delivery is scheduled for 1965. This 21,000 ton liner will carry 50 first class and 770 tourist class passengers. On cruise it will carry maximum 450 passengers. Every cabin will have its own shower, lavatory and telephone. Speed will be 20 knots. Sagafjord is being built according to the highest standard of Det norske Veritas, the Norwegian ship classification society, as are all the other ships shown on these pages.

② Biggest ship in the Norwegian merchant marine and biggest ship built in Norway is the 91,375 tons deadweight tanker Berge Bergesen built by A/S Rosenberg Mekaniske Verksted, Stavanger, for Sig. Bergesen d. y. & Co., Oslo. The ship was handed over early this year in the presence of King Olav. The ship—the world's largest diesel tanker—has been chartered to Shell for 20 years. Berge Bergesen is the first in a series of 91,000 ton tankers to be built by A/S Rosenberg Mekaniske Verksted. The ships—869 ft. l.o.a.—are being built in the yard's dry dock which is one of the largest in Europe.

③ This tanker, the 87,000 tons deadweight Borgsten owned by Fred. Olsen & Co., Oslo, was delivered this year by a British yard and is the biggest tanker ever built in UK. The ship has a number of unconventional features, including a 5-storey tower which replaces the usual bridge. The tower gives exceptional vision for navigation and manoeuvring. Television cameras are installed to cover the blind area in front of the bow, with monitor screen in the tower. From the tower, the camera can be swung, dipped, and zoomed to any view required. From the tower also the main engines can be operated by remote control.

The earnings of the fleet are an indispensable element in Norway's balance of payments. In 1963 gross foreign earnings of the fleet were almost as high as total commodity export earnings. After deduction of operational expenses abroad and capital expenses for ships built abroad, a considerable amount remained to swell the nation's foreign currency income.

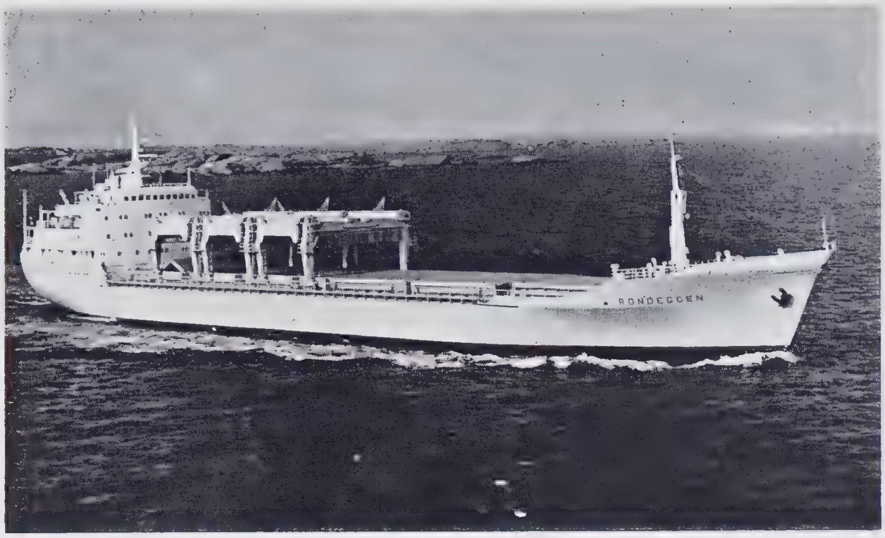
Sweden, West Germany, and UK have for a number of years been the main builders of ships for Norway, and in 1963 Japan too has received large Norwegian orders. Of the Norwegian order reserve at mid-1963 totalling 4.2 million tons gross, Sweden had 38.4 per cent, Norway 20.7 per cent, Japan 14 per cent, Germany 11.5 per cent and UK 7.2 per cent. Norwegian owners took delivery of 1.6 million tons gross in 1963 compared with 1.1 million tons gross in 1962.

In the course of 1963 about 2.5 million tons gross were ordered by Norwegian owners, including a number of very large tankers and bulk carriers in Japan. There has been a marked trend to ordering larger units. In the first six months of 1963, 39 of the tankers ordered for Norwegian account were of more than 30,000 tons gross each.

At the end of 1963, 43 per cent of the tonnage was on time charter for a year or more, 12 per cent was engaged in liner traffic, and 45 per cent was free «tramp» tonnage. Only 0.25 per cent of tonnage was laid up.

By January 1964 the Norwegian merchant fleet totalled 13.7 million tons gross, a 100 per cent increase since 1955. Another 4.3 million tons gross were under construction and on order.

Beautiful sailing vessels are still built in Norway.



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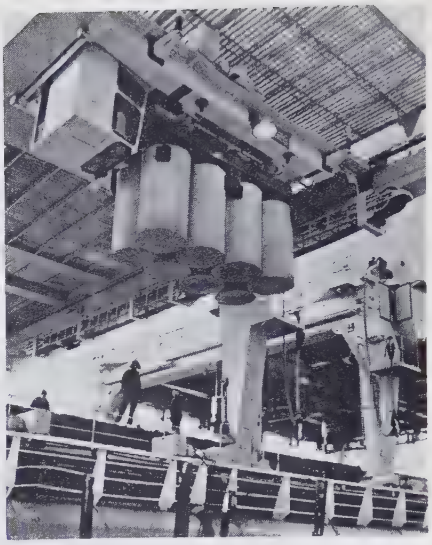

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New ship cranes ① and ②

A dramatic saving in port time has been achieved by installation of rolling deck cranes onboard the freighters Besseggen and Rondeggen operating on the US Pacific coast. The cranes are designed and manufactured by Sverre Munck, Bergen, Norway.

Both vessels are specifically designed to carry newsprint and lumber between British Columbia and US ports. The cranes are reducing port time by about 80 per cent. Average discharge capacity is 338 rolls of paper per hour per crane, or a total of about 1,000 rolls per hour for the 3 cranes on each ship.

The rolling deck cranes travel fore and aft on rails mounted on the deck. Hydraulically operated hinged jibs extend out over the ship's sides when loading and unloading. Permanent semitranslucent weather cover over the main girders gives protection against rain and snow. «Curtains» at the sides of the cranes also give protection.

Previously 60 men needed 3 days to load or unload newsprint onboard a ship of Besseggen's or Rondeggen's size (9,300 tons dw.). With the new Munck deck cranes, 10 men can do the same work in under 10 hours.

The ships are built by the Norwegian yard Kaldnes Mek. Verksted A/S, Tönsberg, Norway.

Hydrofoil ③

This hydrofoil operating between Denmark and Sweden is one of two built by the Norwegian yard Westermoen Hydrofoil A/S, Mandal, Norway, for Danish owners. Two similar hydrofoils will operate between Oslo and the Norwegian yachting resort Hankö as from this summer. The hydrofoil boats by Westermoen carry 73 passengers and have a speed of 30 knots. For some years, hydrofoils have been operating in summer on Norway's west coast between Stavanger and Bergen.

Nasty ④

is a new class of fast patrol boats designed by the Norwegian naval architect Jan H. Linge, developed and marketed by Boat Services Ltd. A/S, Oslo, and built by their yard, A/S Westermoen Båtbyggeri og Mek. Verksted, Mandal, Norway.

The Royal Norwegian Navy placed an initial order for 12 boats. All of these are now commissioned, and a repeat order for 8 boats has been placed for delivery up to the middle of 1964. In addition, two units have been delivered to the West German Navy. USA has taken delivery of two units and recently bought four more.

DET NORSKE VERITAS

The Norwegian ship survey and classification society Det norske Veritas, Oslo, with a staff of more than 425 engineers, scientists, and specialists, and with inspectors in more than 250 places throughout the world, is one of the largest technical organizations in Norway.

Established exactly a century ago, in 1864, Det norske Veritas is now responsible for the classification of more than 2,300 vessels totalling more than 18 million tons dw. Three hundred ships more, totalling some 7.5 million tons dw., are under construction or on order to the class of Det norske Veritas. Most of the vessels are Norwegian, but almost 2 million tons of Swedish and other foreign tonnage are also sailing to Det norske Veritas class.

A continuous programme of research is conducted which has resulted in a number of reforms in terms of ship safety and efficiency. Rules and specifications are constantly being modified to meet changing conditions in terms of materials, structural advances, and requirements for carriage of new cargoes.

Det norske Veritas offers its services and assistance to owners abroad wishing to build anywhere in the world.

SHIPS AND BOATS

Output by Norwegian shipyards has increased spectacularly in recent years. In 1963 deliveries were the largest ever at 370,000 tons gross. This compares with only 40,000 tons in 1939 and 60,000 tons in 1950. Launchings in 1963 included tankers up to 91,000 tons dw. and bulk carriers up to 30,000 tons dw. During 1963 Norwegian yards obtained new orders totalling about 300,000 tons gross, and total tonnage under building or on order in Norway early in 1964 amounted to about 1 million gross tons.

Norway has many boatyards to meet the needs of the Norwegian fishing fleet. Now an increasing number of foreign orders are also being obtained. This year Morocco placed an order for 20 fishing boats. Chile recently ordered 4 vessels. Biggest foreign customers, however, are still Iceland and the Faero Islands.

Norway has long had a reputation as designer and builder of sailing yachts, and there is a considerable export of such elegant craft as well as of plastic cabin cruisers and runabouts and dinghies.

SHIP'S EQUIPMENT

Norway as a leading shipping nation has naturally developed an important manufacture of ship's equipment. Such equipment is being exported on a growing scale.

A Norwegian manufacturer—A/S Hydraulik Brattvaag, Brattvåg near Ålesund—was the first in the world to introduce hydraulic winches and other deck machinery of the low pressure type. This company has supplied deck machines to more than 5,000 vessels and has orders for 150 ships totalling 1 million tons building in 20 countries. There are now several other manufacturers of hydraulic deck machines in Norway, including the Norwinch Group, Bergen. This company recently secured a contract for complete hydraulic winch equipment for 8 Soviet factory trawlers under construction in Netherlands and Denmark.

Hydraulic steering gear is exported on a considerable scale by Johan Tennfjord Mek. Verksted, Tennfjord near Ålesund, and another important manufacturer is A/S Frydenbö Slip & Mek. Verksted, Bergen. Also somewhat a Norwegian speciality are controllable pitch propellers, manufactured in particular by A. M. Liaaen Skipsverft & Mek. Verksted, Ålesund.

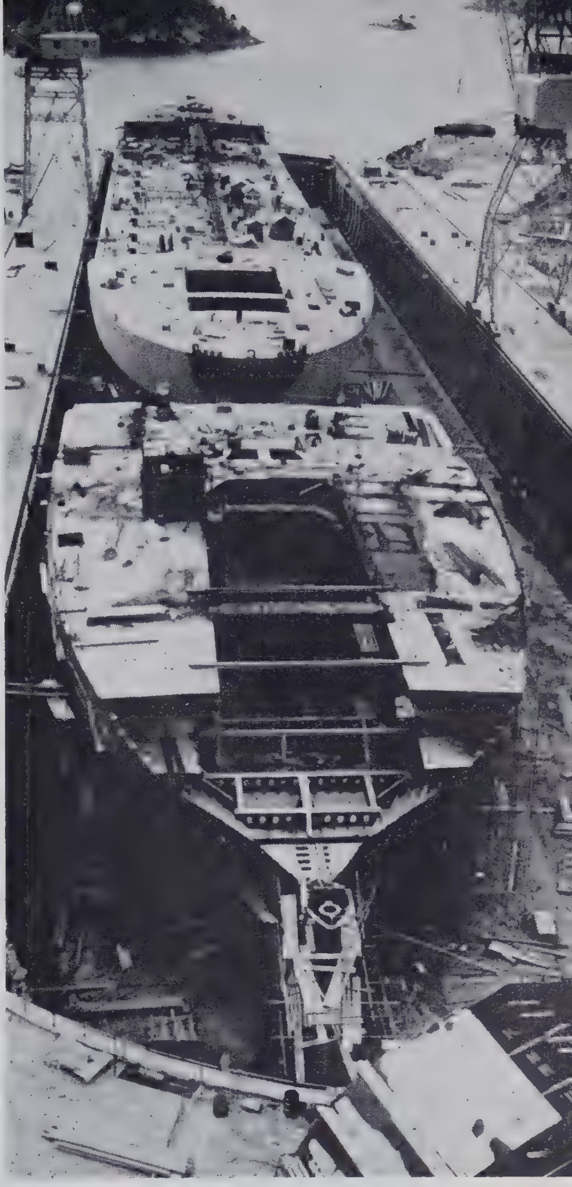
Low pressure diesel engines by the Normo Group, Bergen, are winning an increasing market abroad. Normo and Norwinch sales are by the Bergen shipyard A/S Bergens Mekaniske Verksteder which also has an important production of auxiliary diesel engines. Recently an order was secured for 28 large auxiliary diesel engines for delivery to the Swedish yard AB Götaverken.

Electric steel cast stern frames and rudders are manufactured and exported by A/S Strömmens Værksted, Strömmen, for ships up to 100,000 tons. The same company also has an important production of propellers.

There are several manufacturers of lifeboats in aluminium and plastic which are being exported to a number of countries including Japan. Various other articles for ships in weight-saving aluminium are made by a number of firms in Norway including Marine Aluminium, Haugesund.

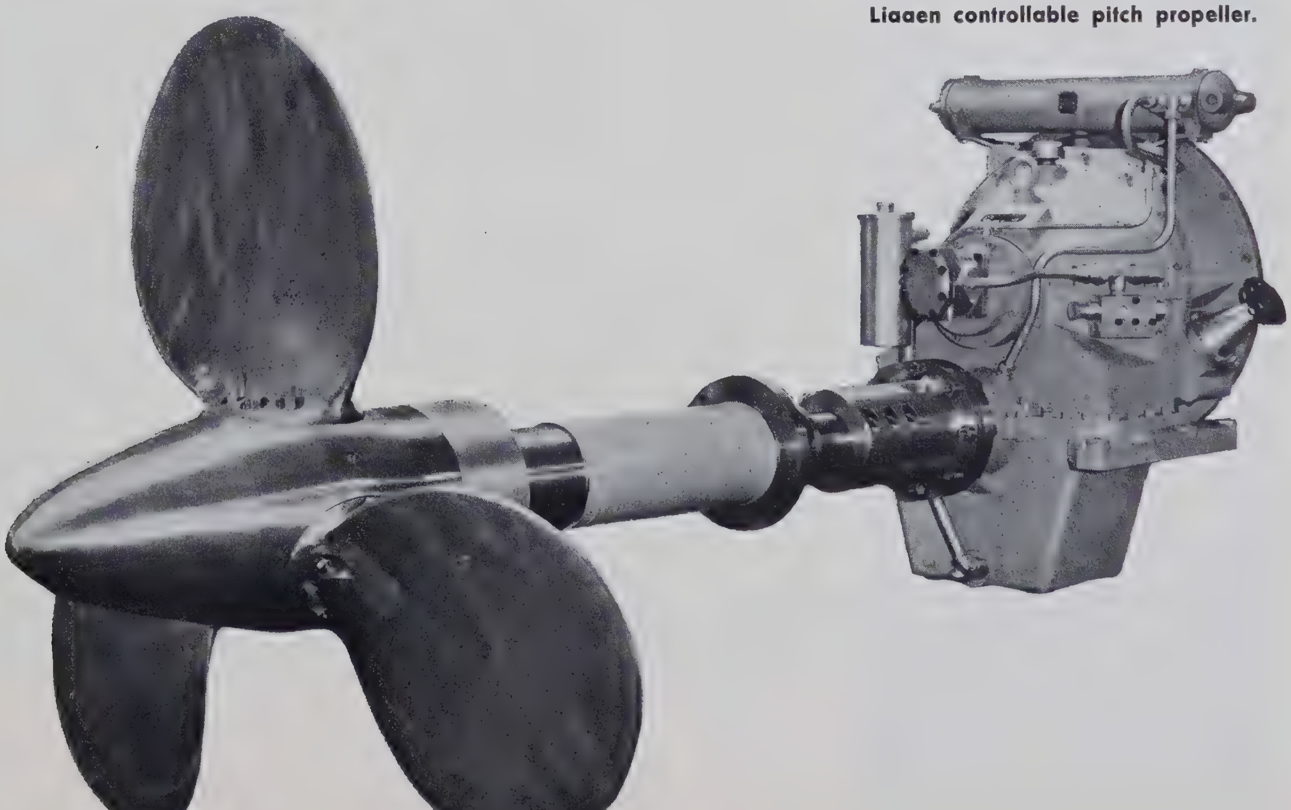
In the radio and electronics field, important are the wireless stations by A/S Elektrisk Bureau, Oslo, and the radar sets by A/S Nera, Oslo. Exported world-wide are the Simrad echo sounders by Simonsen Radio A/S, Oslo.

For shipyards, but also as part of the regular equipment of ships, Unitor A/S, Oslo, makes a wide range of electric welding equipment. There are depots and agents in more than 70 leading ports throughout the world. The new Arendal shipyard, Sweden, has installed 415 Unitor welding transformers.



Building dock at Stord shipyard, West Norway. This yard is a member of the Akers group of shipbuilders.

Liaaen controllable pitch propeller.



NEW SKILLS - NEW EXPORTS

The potential of a nation can long lie untapped until a special challenge or a favourable opportunity occurs to set the wheels of new initiative in motion. Centuries of foreign control had dulled the edge of enterprise in Norway from the Middle Ages to 1814. The rebirth of national independence and the progressive promulgation of civil liberties and democratic rights were a stimulus to economic progress, and when too a new source of power was discovered and developed in Norway's «white coal», the wind was set fair for economic diversification into the new fields of engineering and manufacture.

The ESSI Director is a general unit for continuous numerical control of machine tools. For flame-cutter applications it can be equipped for multiaxis path control for single or double-flame cutters. The Director is all-transistorized, and only 10 different types of plug-in cards are used for logical functions, thus making servicing very simple. All circuits are conservatively rated, and a simple and rugged construction ensures high reliability. Full specifications can be obtained from Kongsberg Våpenfabrikk, Kongsberg, Norway.

Conditioned by specific needs of the Norwegian economy, in turn determined very largely by the physical geography of the country, a considerable engineering and manufacturing industry has grown up during the last century, and in particular during the last few decades.

Water power development has provided the basis for the manufacture of turbines and generators and transformers, and in this field Norwegian industry is now supplying the greater part of Norwegian requirements. Of transformers there is also some export.

Electric smelting in the metallurgical field has become a Norwegian speciality which has resulted in the development of processes and plant such as the Söderberg electrodes and the Elkem furnaces which are world-marketed. In this field, Norway is engaging in world-wide consulting and contracting activities.

The large Norwegian merchant fleet has encouraged the growth of shipbuilding, though the majority of ships are still built abroad. In 1963 deliveries by Norwegian yards were a record 550,000 tons dw., but significant too is the variety of tonnage, including many small, specialized vessels, as well as large super-tankers and bulk-carriers.

Manufacture of equipment for ships has become important, and there is a growing export in this field. Hydraulic deck machinery has become an important manufacture and export, and likewise steering machinery and reversible pitch propellers. There is a growing manufacture of main and auxiliary diesel marine engines.

The large fishing fleet and allied fish processing industry have also given rise to interesting manufacturing activities. Fishing boats are being exported on a growing scale, and also a great deal of fishing equipment and aids, from nets and lines in the new synthetic materials to advanced electronic echo sounders and sonars, from plastic floats and fenders to fish meal and oil reducing plant.

Forestry and wood processing, another main pillar of Norway's economy, have provided the basis for a flourishing production and export of chain power saws and forestry equipment generally, and there is a considerable manufacture of plant for pulp and paper mills and for sawmills and woodworking.

Farming in Norway's difficult terrain has encouraged the manufacture of ploughs and other equipment for tractor-mounting, specifically designed for Norwegian conditions but also finding a market abroad.

Engineering and manufacturing in fields directly allied to Norway's basic occupations have provided a milieu of experience and training which in turn has resulted in production and export of articles which have no direct bearing on specifically Norwegian conditions.

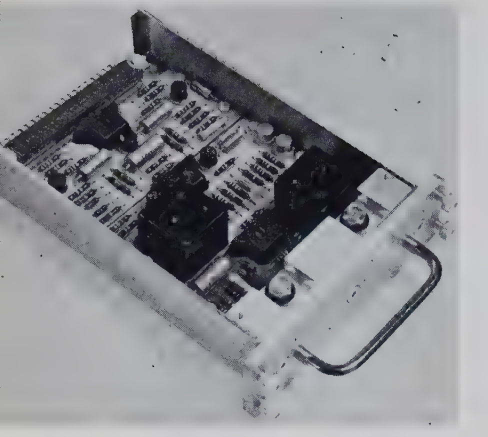
Such for instance is the case with the manufacture of adding machines and cash registers for a world market by a Bergen company. Another company in Bergen has developed world-wide sale of electric hoists and cranes.

In Oslo there is a large production and export of tape recorders, and transistor radios have also won a market abroad. In the radio and electronics field there is also an interesting manufacture of microwave link equipment. Two manufacturers of compact modern inter-com telephones are exporting on a growing scale.

Electric domestic appliances, cookers and washing machines, refrigerators and freezers, are a large manufacture in Norway. In heating, there is a varied production of stoves, boilers, radiators, and electric panel heaters. Two Norwegian ceiling heating systems have been introduced abroad.

Kitchenware and other domestic articles in stainless steel, aluminium, and plastic are an attractive production in modern design which is being increasingly exported. Likewise, plastic and laminated floor and wall coverings.

It is, of course, an important part of the function of the Export Council of Norway to assist in promoting the export of new products. With headquarters in Oslo and a branch office in Bergen, the Export Council of Norway has representatives abroad in London, Hamburg, Stockholm, Copenhagen, Hague, Rome, Madrid, New York, San Francisco, Sao Paulo, Rio de Janeiro, Santiago, and Lagos, and cooperates elsewhere closely with Norwegian diplomatic stations and chambers of commerce. A quarterly magazine—Norway Exports—in English, French, and German editions presents Norwegian export products to a world-wide readership.

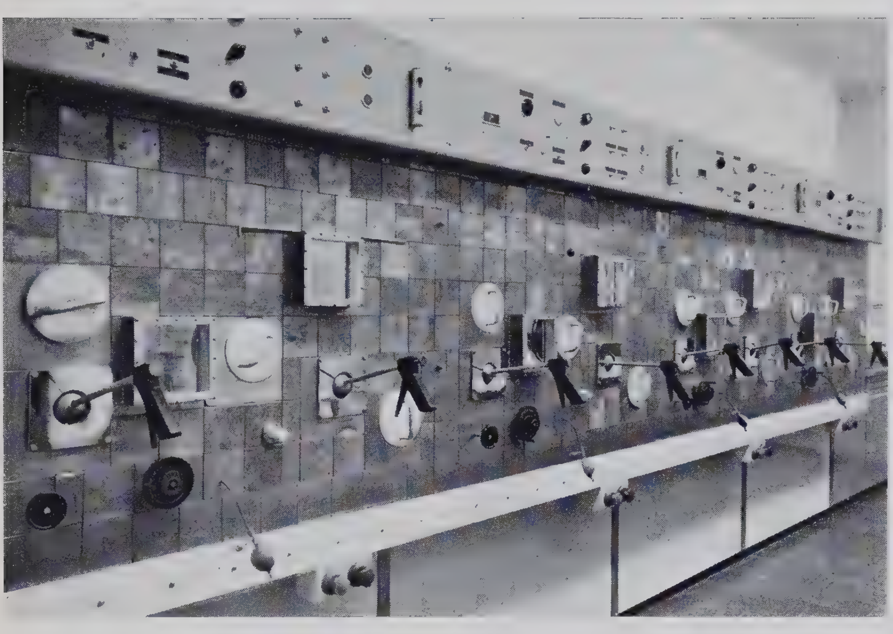


Servo unit by Kongsberg Våpenfabrikk.

SERVO

Kongsberg Våpenfabrikk was established in 1814 to manufacture hand weapons, and for more than a century that was the main production. Today production embraces tools, automobile parts, rotary presses, remote controlled artillery, small arms, anti-submarine weapons and rockets. Special attention has been paid to designing and manufacturing analogue computers, digital computers, and servo control systems. Kongsberg Våpenfabrikk manufactures the servo motor for NATO's Sidewinder rockets and also gyro units for NATO's Bullpup rockets. Kongsberg Våpenfabrikk employs 2,000 persons of whom several hundred are engineers and experts engaged in product and process development.

ATOMS



Noratom A/S, Oslo, seeks to exploit know-how from Norwegian research organizations, particularly the Institute of Atomic Energy (IFA), Kjeller, now operating 3 reactors, one of them since 1951. Apart from reactors, IFA operates a plant for treatment of irradiated fuel, a waste treatment plant, a laboratory for isotope production, and a number of general purpose laboratories in the atomic field. Experience from the establishment and operation of these installations forms the scientific background for the activities of Noratom A/S. The picture above shows isotope production equipment by Noratom A/S, complete with lead wall, tongs, lead glass windows, port holes, pipetting devices etc.

AUTOMATION

The AUTOKON system and the ESSI Director, both developed in Norway, are significant new contributions to automation techniques in the design and construction of ships.

The ESSI Director manufactured by Kongsberg Våpenfabrikk, Kongsberg, Norway, developed in association with The Central Institute for Industrial Research, makes it possible to control the production machines in the shipyard more or less directly from the numerical data produced in the design office.

Important work is being done by Norway's Central Institute for Industrial Research on developing computer programmes with the machining plan specified by symbols. The work done in this field by the Central Institute for Industrial Research has resulted in an integrated system for ship plate manufacture called the AUTOKON system.

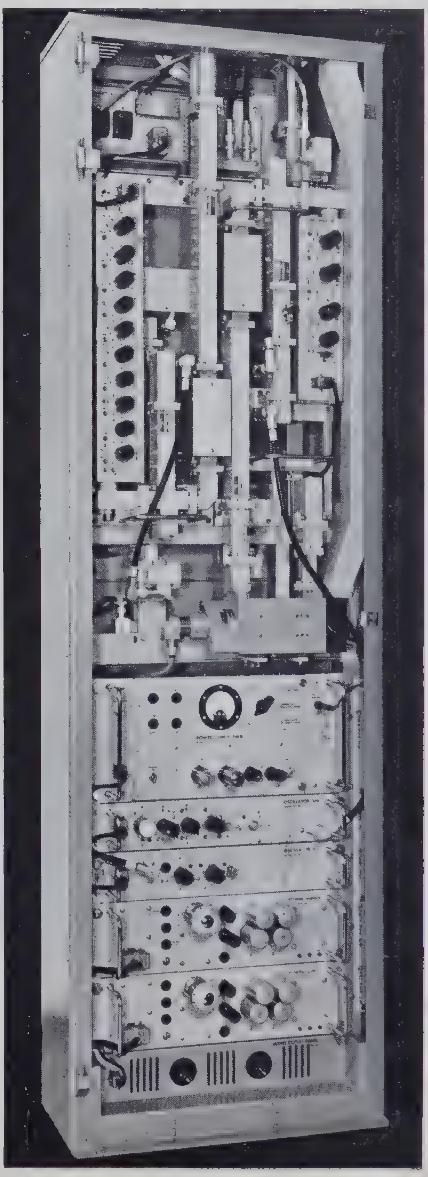
The AUTOKON system has been developed by The Central Institute for Industrial Research, Blindern, Oslo, in close cooperation with the leading shipyards A/S Akers Mekaniske Verksted and A/S Bergens Mekaniske Verksteder. This Norwegian group offers its services, including a licence agreement for the use of the present AUTOKON and its future development, to all interested industries.

Microwave reflectors on Norwegian mountain top.

MICROWAVE

Norway has the most extensive microwave radio relay network in Europe with more than 130 relay and terminal stations. Capacity ranges from 24 channels to systems capable of carrying 960 telephone channels, 5 multiplexed radar pictures, or TV. Microwave radio-link equipment by A/S Nera Bergen was chosen by SHAPE as tail links for NATO's Forward Scatter Telecommunication System linking the NATO nations from Norway to Turkey. A/S Nera, Oslo, manufactures a range of other communication equipment including telegraph and telephone transmitters and receivers, navigation radars, VHF radiotelephones for marine and land-mobile services, radio communication and broadcasting transmitters, and television transmitters.

A/S Nera is producing a new high capacity microwave link for 960 channel telephony and TV service between Bergen, West Norway, and Bodö, North Norway. The radio equipment is either terminal or repeater version. The picture below shows the radio repeater with doors removed. ▼



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① The Luxo lamp by Jac. Jacobsen A/S, Oslo, has been sold by the million throughout the world. It is made in a number of versions with a range of shades and brackets for working purposes and also for the home. It was picked by Fortune Magazine as one of the 100 best designs of modern times.

② The Regna cash registers and Adwel adding machines by Jörgen S. Lien, Bergen, are exported to 90 countries. More than 90 per cent of output is sold abroad.

③ A portable transistor radio by A/S Radionette, Oslo, Norway's largest radio manufacturer. Founded 1927, A/S Radionette was the first in Europe to introduce an AC mains-powered radio receiver. Output today includes combined portable radio and record-players with 4 wave bands including FM, also TV sets and tape recorders.

④ Tape recorder by Tandbergs Radiofabrikk A/S, Oslo, are designed for professional use and Hi-Fi enthusiasts. Exports go chiefly to USA and Sweden and increased 60 per cent in 1963. Production capacity will be doubled when a new factory is built to employ 500 persons.

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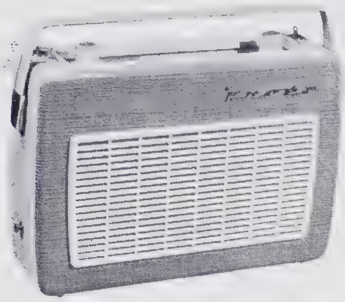

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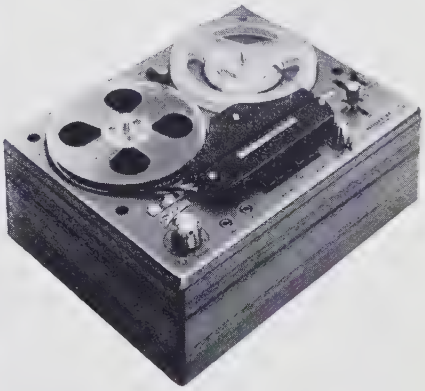

Sweaters in gay Norwegian patterns and strong, soft Norwegian wool are a popular export.

◀ Textiles woven in Norwegian wool for furniture and clothes are exported on a growing scale.

TEXTILES AND CLOTHING

It is a century and a half since the first water-powered machinery for spinning and weaving was installed in Norway. It marked the start of power-operated mechanized industry. In the course of the 19th century other large spinning and weaving mills were established, in West Norway particularly. The garment manufacturers, spread widely over the country, took more and more of their yarn and fabric requirements from home mills. The Norwegian textile and clothing industry is now producing yarns, fabrics, and garments of quality and character which are finding an assured market at home and a growing market abroad.

Since the war the industry has more than doubled its output, and in the last few years the value of textile and clothing exports has increased 5-fold.

Yarn production was 7,500 tons before the war, whilst now it exceeds 17,000 tons.

Production of woven fabrics was 6,800 tons before the war, whilst in 1962 it was 10,300 tons.

Output of knitwear was 2,600 tons before the war and 4,000 tons in 1962.

The progress of exports has been remarkable. The annual average export of yarn in the last few years before the war was 19 tons only, in 1951 it was 175 tons, in 1962 more than 4,000 tons. Most of this was rayon yarn and rayon wool yarn, but the export of wool yarn has also advanced notably, from 3 tons pre-war to 772 tons in 1962.

The export of woven fabrics has increased from 80 tons pre-war to 1,000 tons in 1962. Half of this was wool fabrics, the rest cotton and rayon/nylon.

The annual export of knitwear was 26 tons before the war, 1,000 in 1962.

Progress is particularly marked for exports of Norwegian wool products. Norwegian wool enjoys a reputation for strength, warmth, elasticity, resilience. It is relatively coarse and is particularly suitable for chunky knitwear and heavy fabrics such as tweeds and also for carpets. The Norwegian wool cut is about 4,500 tons a year and derives from sheep mostly in West Norway living in a damp climate and enjoying rich summer pastures.

Geographical and other factors make it impossible for Norway to compete abroad with very cheap staple goods. The export sales which have been secured in the last few years have been won largely on the excellence of the raw material, on the reliability of work and finish, and not least on designs that are characteristically Norwegian or Scandinavian in inspiration.

In knitwear and in fabrics, patterns and colours owe much to Norway's ancient rural art and craft traditions. Designers, adept at blending the best of old and new, are playing an important role in Norway's expanding textile and clothing industry.

Sweaters and cardigans, socks and mittens, in Norwegian wool and Norwegian designs, are still the most important Norwegian garment export. However, exports of other garments are developing, particularly sports clothes for skiing and other outdoor sports and pursuits.

Norway has a large home market for sports and leisure clothes, a knowledgeable public that demands garments that are both practical and attractive and generally in the medium price class. On the basis of the large home sale, Norwegian garment manufacturers have been able to build up a sufficient output to compete successfully also abroad in the sports and leisure wear market.

Now one sees too a growing effort to export standard garments such as ladies' coats and suits and men's shirts. Good fabrics, imported and Norwegian, and a high level of workmanship and finish, coupled with close attention to international fashion trends, suggest that the export of standard garments will also gradually increase.

A Norwegian speciality is the string vest which was developed for mountaineering and military use but which has subsequently in more sophisticated versions become popular among people of many countries.

BEAUTY AND FUNCTION

Even in the relative poverty of the early 19th century, Norwegians set store on grace and ornament, on gay colour and bold design. In wood and wool, in iron and silver, in glass and pottery, articles of beauty were produced by craftsmen, with skill and loving patience, to enrich the simple cottage and the elegant town house. As the 19th century advanced, the standard of taste fell somewhat in step with the easy elaboration of mechanical production. The 20th century has seen a renaissance of good design that captures the best of past and present.

A small country, Norway must concentrate more on quality than quantity in its production and export trade. Naturally, therefore, the concept of industrial design has become a vital factor in the quest to manufacture and market successfully.

Design, of course, has never been entirely foreign to the mind of the Norwegian producer of finished articles, and there are countless examples extant of fine workmanship and fine æsthetics going back even to Viking times. Industrial design, however, presents particular problems which have taken time—perhaps the most of two centuries—to solve. Throughout the world there are examples of the excesses which the first flush of industrial achievement and repetitive production gave birth to in terms of ostentatious ornamentation.

Today a sober and restrained approach reflects a reaction in taste, but it also reflects an appreciation of the technical and functional factors which must be borne in mind when new products are to be launched, using new materials, new manufacturing processes, where every detail of design can have significance in terms of efficiency and economy, especially when multiplied through mass production.

Norway has not many large manufacturing units, but it has seized wholeheartedly the opportunities which modern machines and materials offer, and its production equipment is up to date and efficient and competitive. Norwegian manufacturers have increasingly realized that, in order to seize full advantage of these opportunities, they must enlist the aid of the industrial designers whose whole approach is acceptance of modern materials and methods of production and a desire to exploit them, efficiently and economically, for the creation of everyday articles that are good to look at and good to use.

The industrial designer versed in all the complexities from drawing board to planning, from production to marketing, is a rare bird still, but it is correct to claim that Norway has now a considerable corps of designers who are making an important contribution to furthering production and export of manufactured articles that are competitive, efficient, and attractive.

The advance of the industrial designer is a world-wide movement, but it is tempting to try to explain his importance in the context of specifically Norwegian conditions. Primarily there is the competitive factor—the need for a small country to shine exportwise not in terms of the weight or volume of its exports, but by virtue of quality. But quality, like design, is not something that can be superficially applied if it is to be enduring and convincing. It must rest on deep foundations. The foundations of Norwegian manufactured exports are the demands made by the home market. A population of 3.7 million, used to the nagging needs of a careful economy, demands quality, and it is this demand that determines the standard of production.

DESIGN CENTRE

The new «Indeks» House—headquarters of Norway's Export Council and Norway's Federation of Industries—now under construction in Oslo, will also house Norway's first Design Centre. Spacious premises are reserved for this Centre, where all that is best in Norwegian industrial design will be displayed for inspection by foreign and home visitors. The Centre will open in 1965.

Sewing table designed by Rastad and Relling and made by Solbergs Möbelfabrikk, Ski, Norway.

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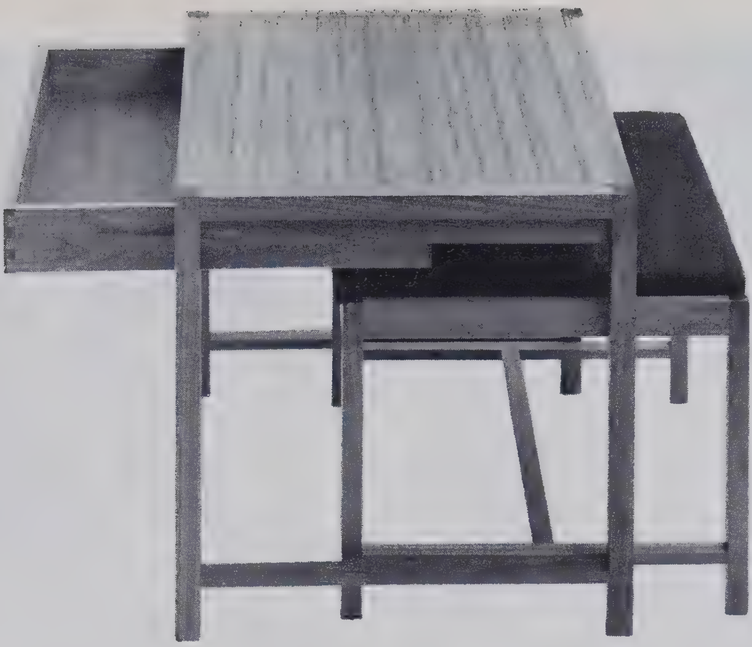

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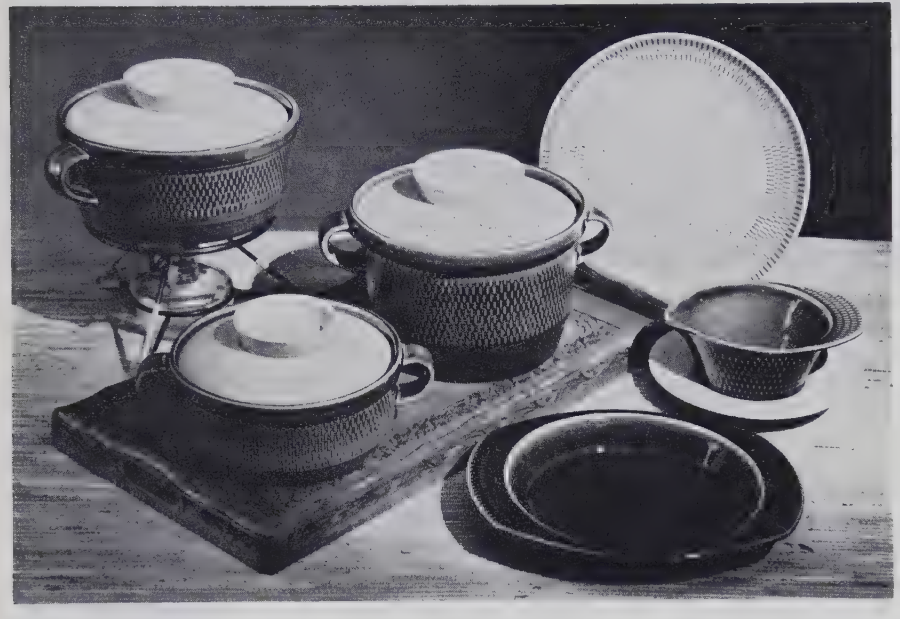

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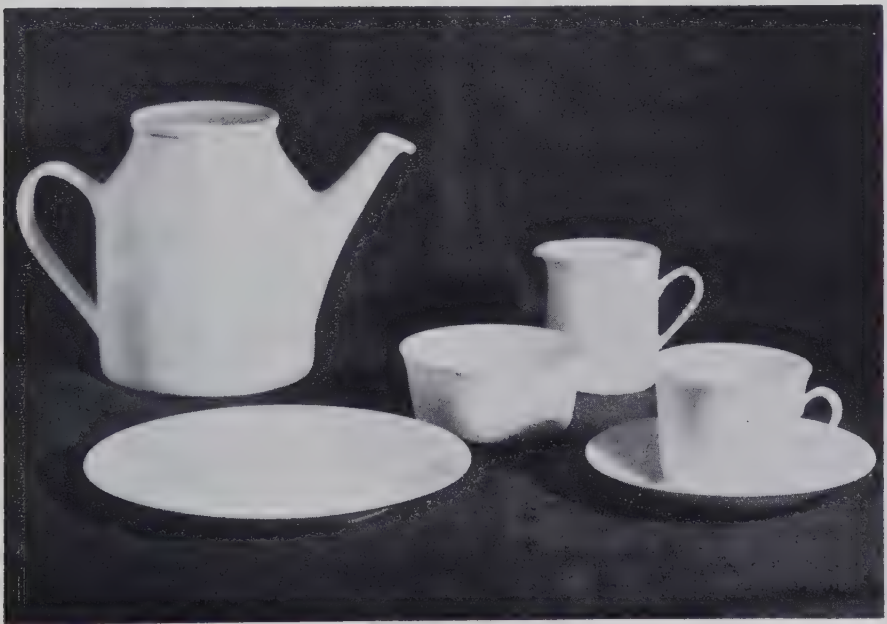


FURNITURE

Norway has several hundred furniture manufacturers. Most of these are small firms, but the combined capacity is large. Moreover, Norwegian furniture production is remarkable for the variety of models, to suit most tastes and requirements. Generally, the standard of design is high, with emphasis on furniture in the modern Scandinavian style which is world-acclaimed. This is furniture which is practical, designed to fit the compact and functional home of today. At the same time it is good-looking furniture, combining efficiency with a simple elegance which goes deeper than the whims of passing fashion.

Working in wood is a tradition and a skill in Norway where forests cover a quarter of the land surface. Wood has down the ages been the principal raw material, fashioned into countless articles. Norwegian furniture mirrors inherited skill and experience. Technical excellence—sound construction, good finish—is a built-in feature of furniture from Norway.

EARTHENWARE

Three earthenware manufacturers in South-West Norway have won a large market abroad for their dinner, tea, and coffee services and various gift articles in attractive modern designs. The Norwegian earthenware is fired at high temperature for minimum porosity and maximum strength, and is marketed under the designation «flint» in contrast to the former faience earthenware. Technical excellence is backed by a large team of designers working in the contemporary Scandinavian style.

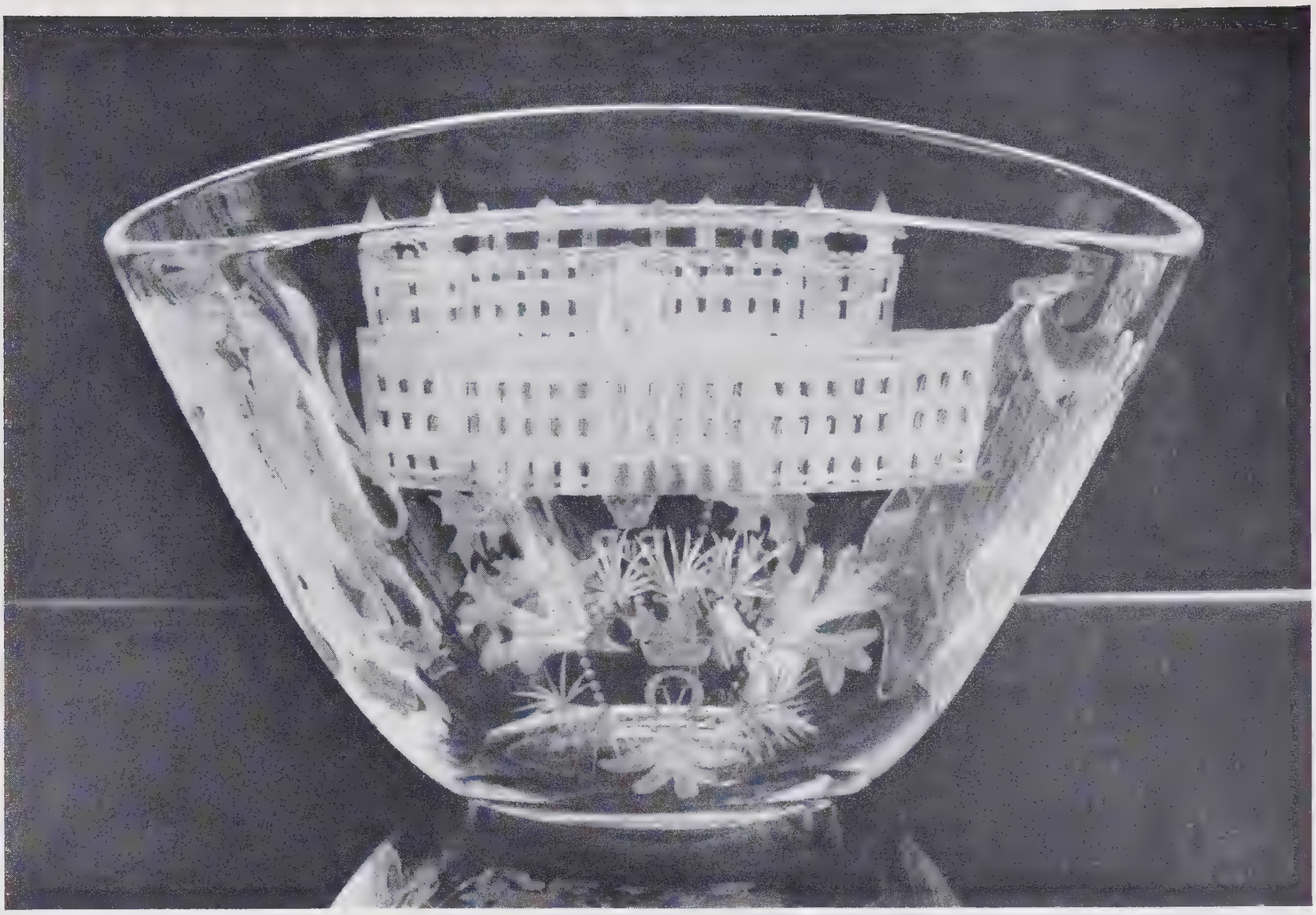
PORCELAIN

Sole producer of porcelain in Norway is Porsgrunds Porselænsfabrik, Porsgrunn, 100 miles south-west of Oslo. By Norwegian standards this is a large concern, with 500 workers, including a strong team of designers. Output of tableware and gift articles is some 5 million pieces a year.

① Table and stool designed by Ingmar Relling and manufactured by Brödrene Blindheims Möbelfabrikk, Vegsund, Norway.

② BRUNETTE cookingware with matching dinner service. The flameproof dishes have relief decor and are brown with cream-yellow lid. Designed by Kåre B. Fjeldsaa and made by Stavangerflint A/S, Stavanger. Also producing and exporting earthenware on a considerable scale are Figgjo Fajanse A/S, Figgjo near Sandnes, and A/S Egersunds Fayancefabriks Co., Egersund.

③ REGENT is a new coffee service made by Porsgrunds Porselænsfabrik, Porsgrunn, and designed by Tias Eckhoff. It is available in plain white or with a choice of decor.



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① Queen Elizabeth II received this bowl from King Olav V at Holyrood Palace, Edinburgh. Made by Hadelands Glassverk, the design and engraving are by Örnulf Ranheimsæter.

② MINISTER crystal whisky decanter by Hadelands Glassverk. Design: Severin Brörby.

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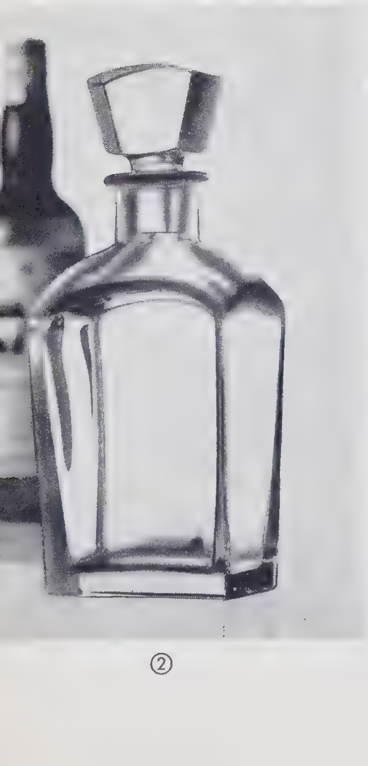

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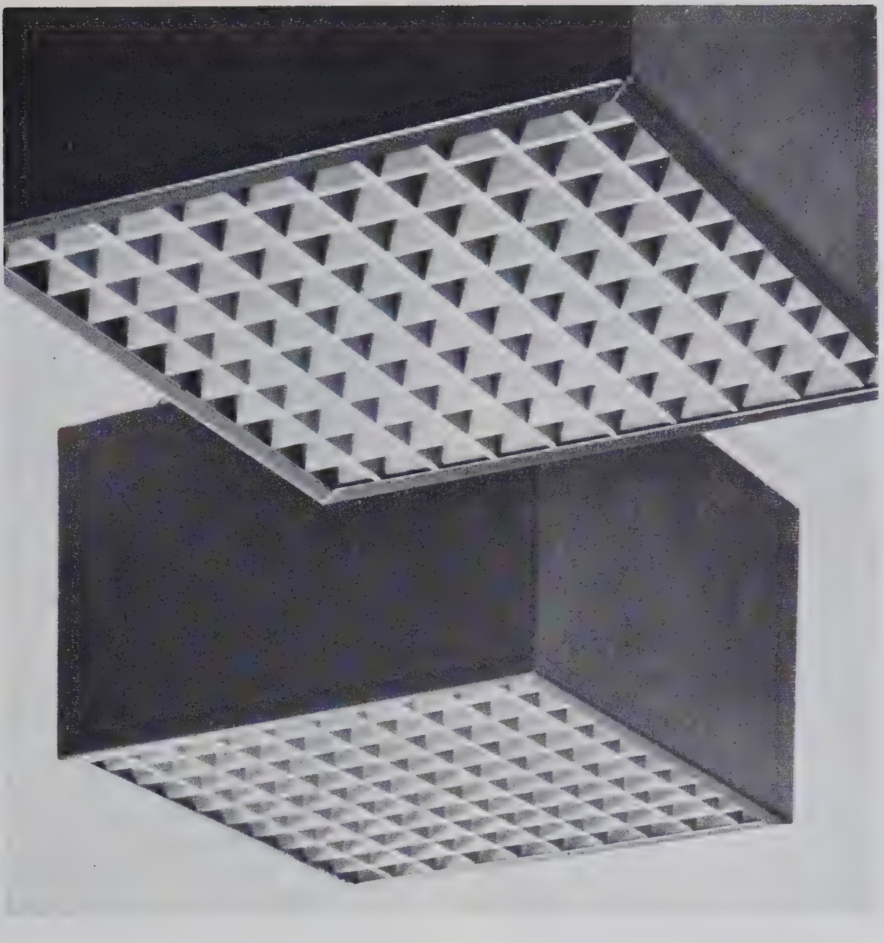
GLASS

Hadelands Glassverk at Hadeland in Jevnaker, about 40 miles from Oslo, was founded in 1762 with the somewhat mundane purpose of producing bottles for the Norwegian and Danish markets. Almost a century passed before it started producing the household glass and art glass and crystal for which it is today renowned. Hadelands Glassverk probably ranks as the largest glass producer in Scandinavia. Production embraces blown and pressed glass as well as lead crystal and art glass, in 15 colours as well as clear flint glass. Output exceeds 6 million items a year. Staff is around 400.

LIGHTING

With long winters and long nights, Norwegians put special emphasis on light fittings of elegance and efficiency. These are very much an integral part of every home, and add brightness and beauty to dark winter evenings. Blessed with plentiful and cheap hydropower, Norway is lavish with its electricity, and electric light fittings are found in great number and variety in every home. The traditional candles are also a favourite in Norwegian homes, and no occasion is considered complete without the gracious glow of candlelight.



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SILVERWARE

Working in silver is an art and a craft that Norwegians have cultivated for at least a thousand years. The Viking ships that were discovered and restored and now stand exhibited in Oslo contained, among many other precious memorials of the past, brooches, rings, and other pieces of jewellery skilfully shaped and executed in silver.

③ One of the leading Norwegian silversmiths is J. Tostrup, Oslo, with a wide production range, not least in the field of enamelled silver. The photograph shows 3 items designed by Grete P. Korsmo in enamelled silver—cigarette box, tobacco box, and vase.

④ Bridal Silver is the name of this silver cutlery set by the Norwegian silversmith David-Andersen A/S, Oslo. Designer was the distinguished silversmith and painter Thorbjörn Lie-Jörgensen. The Bridal Silver set comprises 26 pieces.

⑤ Enamelled steel vase by A/S Cathrineholm, Halden, Norway.

⑥ Ceiling light by Hövik Verk, Hövik, Norway, with grey or white louvre and blue-black lacquered body.

⑦ Coloured anodized aluminium bowls by Emalox A/S, Oslo.

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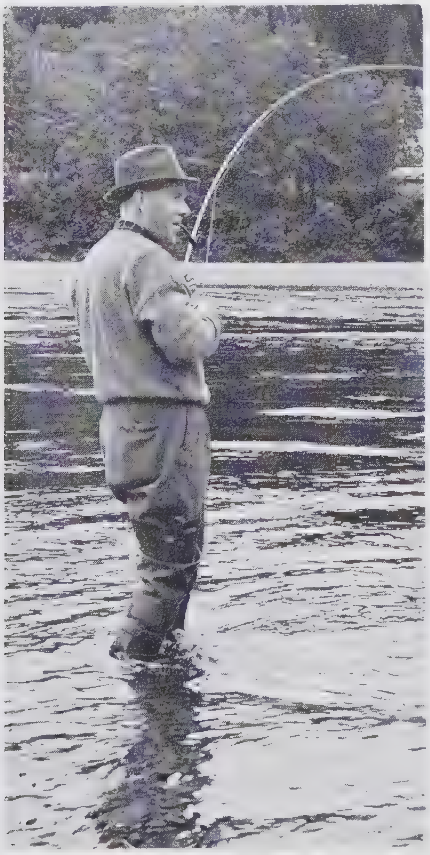
HOLIDAY NORWAY

In 1814 Norway was almost unknown to traveller and holidaymaker. Only a venturesome few visited Norway except on business, and even businessmen were rare. As the century advanced, Norway was discovered by an increasing number of British, French and Germans.
The spectacular fjord scenery, the lure of the midnight sun, and the excellent salmon fishing, attracted visitors to Norway, a country refreshingly unspoilt and sufficiently new and unknown to satisfy the adventurous.

Norway is famed for its salmon and trout fishing.



The boom in the international travel trade since the war has brought a record number of visitors to Norway, with 1963 the best year so far with more than 3 million visitors. Income from visitors was 700 million kroner (£35 million, $100 million).

The major attractions which in tourism's infancy drew the first foreign tourists to Norway are still the biggest draws today. Slogans such as Fjord Country, Land of the Midnight Sun, and Nature's Wonderland show that it is nature itself which is Norway's trump card in the international travel business. The sun, shining continuously 24 hours a day from May to August, has given Norway North of the Arctic Circle its unique title of Land of the Midnight Sun. North Norway with its famed North Cape is the Mecca of tourists from all over the world who come in their thousands every year to visit the Top of the World.

In that typical tourist area, the Fjord Country of West Norway, the travel industry is an integral part of the local economy, and good modern hotels of all kinds abound. Norwegian hotel legislation sets rigorous standards, and there is a system of classification, with Tourist and Mountain Hotels denoting the highest class. The many hotels built or modernized since the war enable Norway to offer comfort and service equal to any in Europe.

Communications have been extensively developed and improved since the war. Many new ships have been built and old tonnage scrapped. The many companies operating services on the West Norway fjords and along the North Norway coast have all taken delivery of fast modern vessels.

More than half of the 4,400 kilometres of railway has been electrified or equipped with modern express diesel trains. The North Norway railway now extends beyond the Arctic Circle to Bodö. The famous Bergen railway, with its branch lines to Flåm and Hardanger, is a notable example of engineering skill and ranks still among Norway's major tourist attractions.

The roads, like the railways, have to be built across difficult country, and many are masterpieces of engineering. The big increase in the number of foreign motorists is proof that even the narrow roads with their hairpin bends are reliable and good. Above all, they offer tourists a wealth of beautiful, breathtaking panoramas of Norwegian scenery.

The airways network has grown rapidly since the war. A Midnight Sun flight Oslo–Bodö–Oslo by night, or a day flight across the mountains to the Western fjords, ranks among the oustanding sightseeing experiences anywhere in the world.

Whilst nature itself is Norway's principal attraction, there is also much that is man-made to interest the traveller. The many Viking antiquities, including the dragon-prowed ships and the unique stave churches, attract thousands of visitors. The Kon Tiki raft, home from its fabulous voyage across the Pacific, is preserved near the Viking ships at Bygdöy just outside Oslo, and is very popular among tourists. Also at Bygdöy lies the Norwegian Folk Museum, an open-air collection of ancient buildings from all regions of the country, where daily life through eight centuries is authentically on display.

A similar very comprehensive collection is at Maihaugen near Lillehammer in Gudbrandsdalen in the very heart of Norway. Much else of Norway's ancient culture is preserved in towns like Oslo, Stavanger, Bergen, and in Trondheim where the mediaeval gothic cathedral is considered the most beautiful and monumental in Scandinavia.

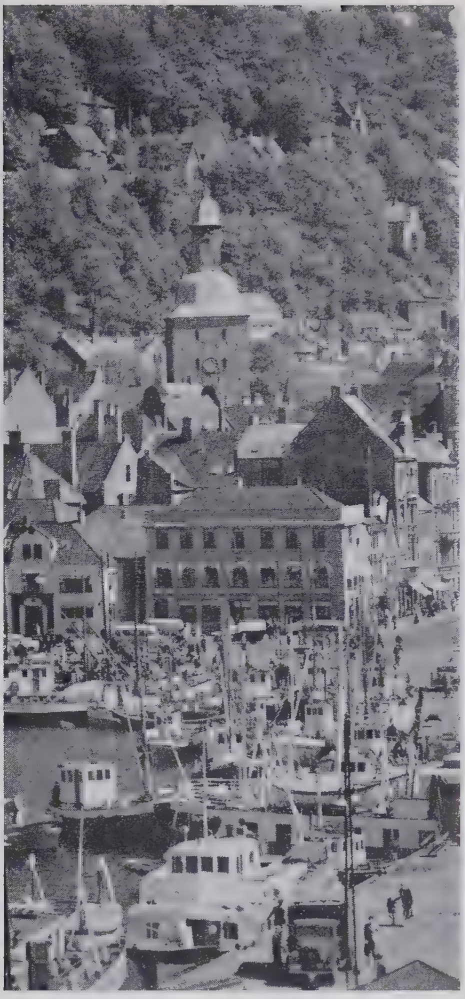
The art and architecture of modern Norway are most notably expressed in Oslo's Town Hall completed in 1950. Another «must» for tourists in Oslo is the immense open-air collection of sculpture by Gustav Vigeland in Frogner Park.

It is not only in summer that Norway attracts visitors from abroad. Winter Norway too is a popular destination for devotees of skiing and other winter sport and recreation. Thousands of Danes and Swedes are regular winter visitors at the many modern tourist and mountain hotels in the valleys of East Norway, Telemark, Hallingdal, Valdres and Gudbrandsdalen.

With the growth of winter sports centres equipped with ski lifts, ski schools, and other amenities, the number of winter sports visitors is mounting.

There are plenty of nursery slopes for the beginner, plenty of fast runs for the expert, and good snow conditions can be anticipated from Christmas to Easter. Norwegians themselves are keen winter sportsmen, and visitors are assured a happy, friendly welcome.

Young folk dancers at the open air museum at Bygdöy, Oslo, where ancient farmsteads from all parts of Norway have been assembled.



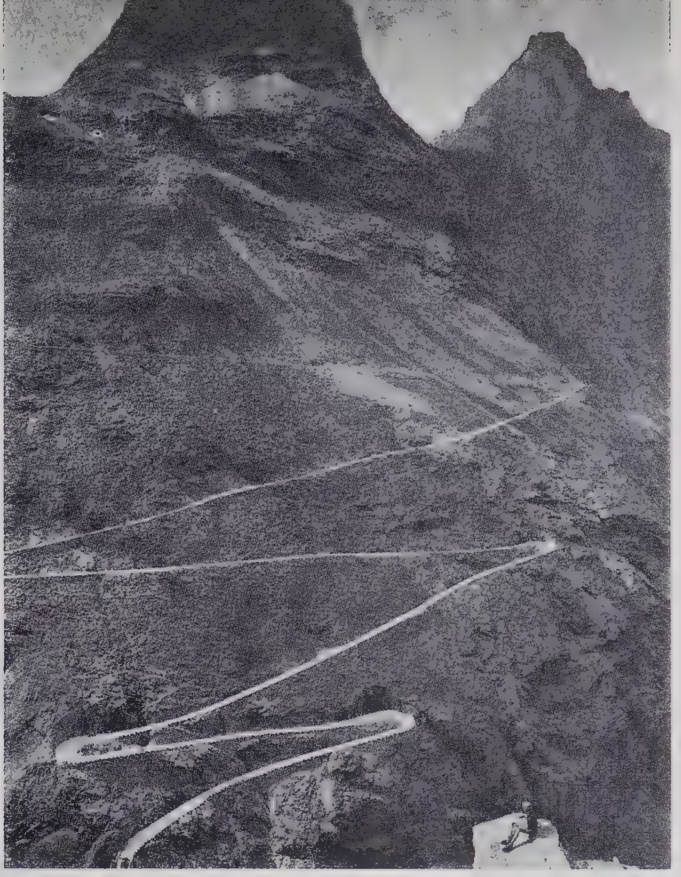
Bergen, a jewel of a town, nestles amid hills in West Norway. Here the International Festival of Music and Drama is held every May.

Peak of the winter sports season in Norway is the Holmenkollen international ski week in March culminating in the jumping contest which attracts up to 100,000 spectators.

Sykkylven, a district in Möre. This county of Norway is noted for the enterprise of its people, and in Sykkylven, Stranda, Örsta and other places, many manufacturing businesses have been established with a flourishing home and export trade in fields as diverse as furniture, clothing, and engineering.

Golden sands and hot sunshine are also found in Norway.

Sailing regattas are a feature of Norway's summer.



Above: One of the idyllic south coast ports.

Right: A mountain road in spectacular landscape.

Below, from left: The riven, rocky shore of Norway.

Nomad Lapps still populate North Norway with their reindeer.

North Cape, where the sun shines night and day in summer.

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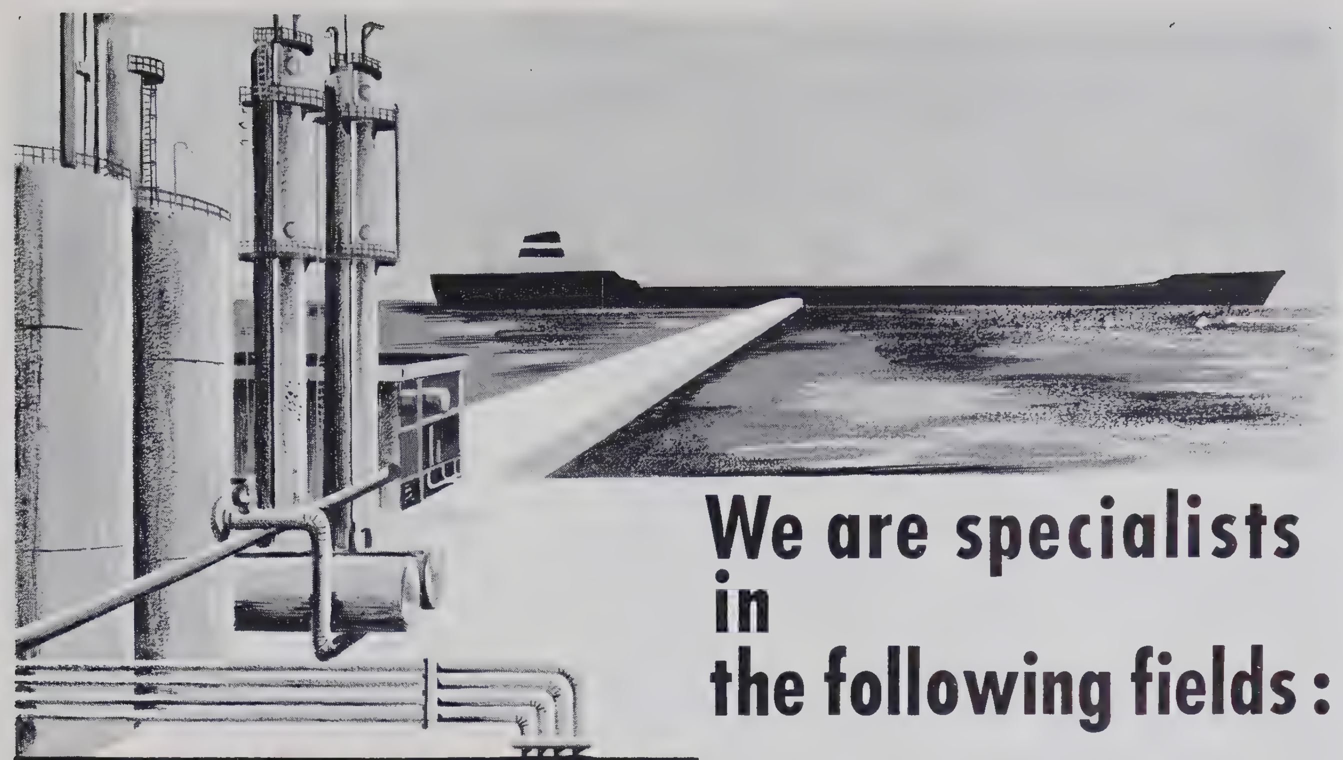

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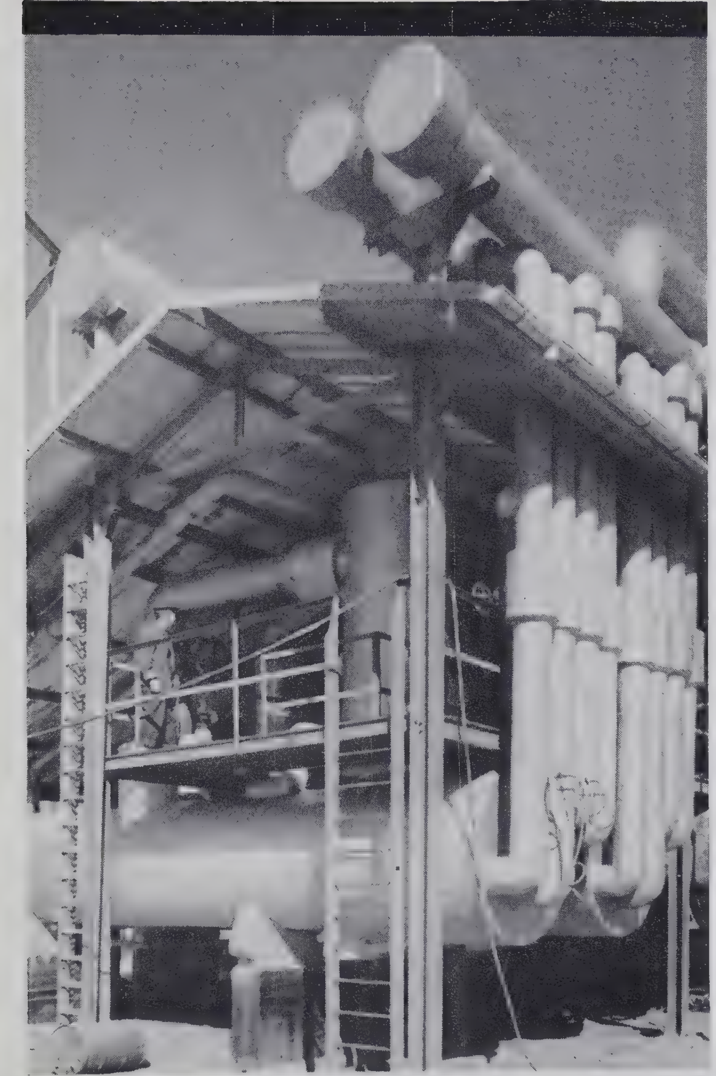

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In 1970 Bergen will celebrate its 900th anniversary. Bergen can boast a 200 years old Symphony Orchestra, Norway's first theatre, and wonderful treasures from the past in buildings and museums. From early spring to late autumn, tourists from all over the world flock to Bergen by sea, by air, and by land. Here are a few of the reasons why:

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- Bergen International Festival—the great attraction of the early summer
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Tradition and experience -the background of

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◄

The quality of Ringnes Beer was excellent, and production techniques were constantly modernized and facilities enlarged to meet the growing demand.
►

In 1886, at the Industrial Fair in Paris, Ringnes received its first international award, the «Diplome de medaille d'or», since which time it has been awarded no less than 22 international distinctions and 15 gold medals. Today people all over the world drink Ringnes beer, and it is served in Norwegian ships on all the 7 Seas. It was fitting, therefore, that Ringnes beer accompanied both the Sverdrup-Nansen polar expedition and the inaugural SAS flight across the North Pole.
◄

The Ringnes Brewery of today is a modern concern, where the making of beer is undertaken on the basis of experience gained during generations, together with the latest improvements in scientific technique. Today, the production output of the brewery is 15 times what it was in 1876, and it is still growing.
►

Old Norwegian tradition and nearly 100 years of experience are the background of every bottle of Ringnes beer. Remember that, the next time you raise your glass of fresh, foaming beer from . .

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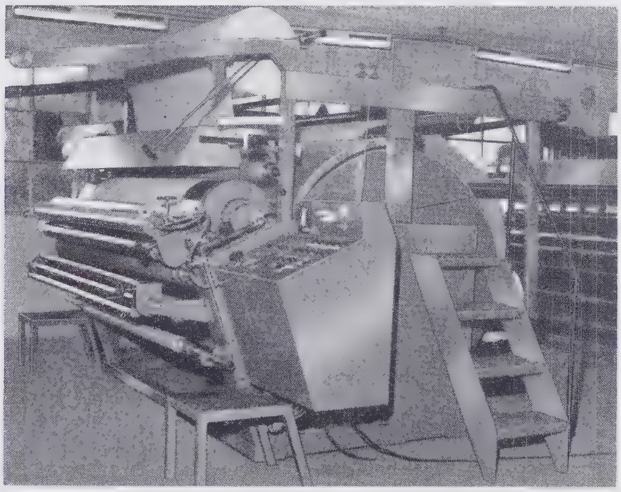

The photograph illustrates this finely designed very compact unit that is successfully operating in European factories. Demonstrations are offered, working on materials supplied by manufacturers if required.

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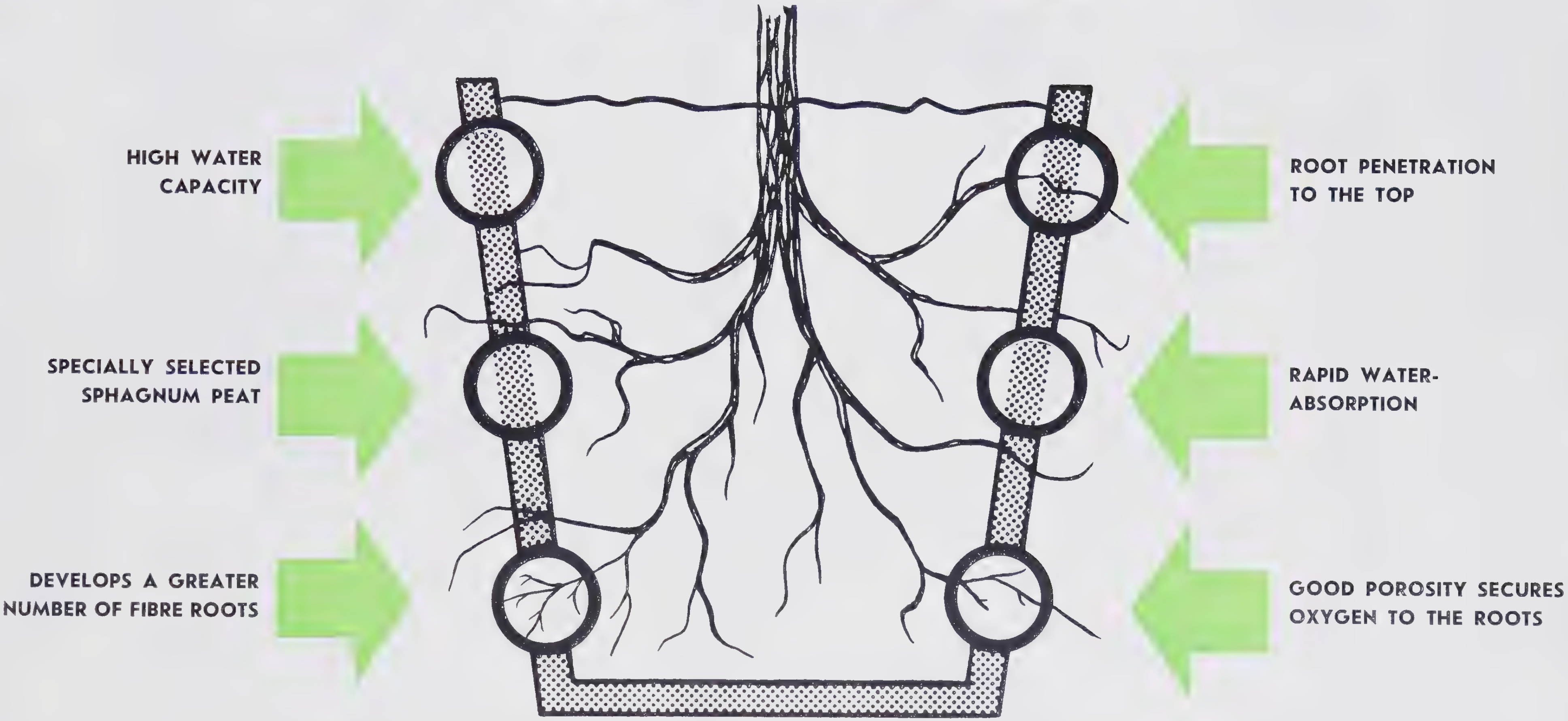
JIFFY-POTS


HIGH WATER CAPACITY
SPECIALLY SELECTED SPHAGNUM PEAT
DEVELOPS A GREATER NUMBER OF FIBRE ROOTS
ROOT PENETRATION TO THE TOP
RAPID WATER-ABSORPTION
GOOD POROSITY SECURES OXYGEN TO THE ROOTS

JIFFY-POTS are made in Norway and used by horticulturists in more than 35 countries. The plant roots grow right through the porous pot walls which are made of 75 % peat. All plants from the most delicate flowering types to towering trees can be started off successfully in JIFFY-POTS.
JIFFY-POTS are the modern aid for nurserymen and gardeners. JIFFY-POTS save time, labour, money.

jiffypots NORWAY

jiffypots NORWAY

JIFFY-POT LTD.
GROUND - NORWAY

We are represented in following countries:

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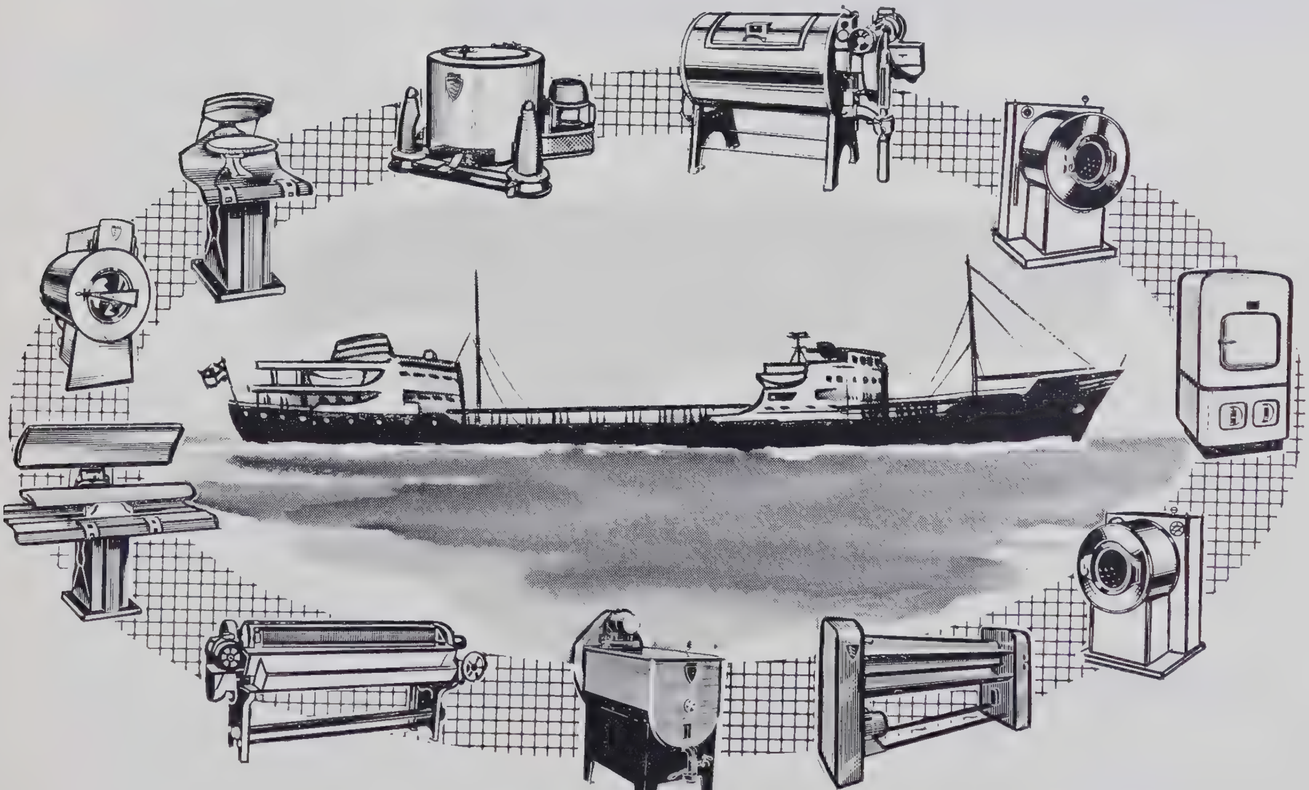
— for apartment house laundries
— for hospitals
— for hotels

THUNE **laundry equipment**

— for ships sailing on the Seven Seas



A/S THUNE-MASKINER
HAMAR

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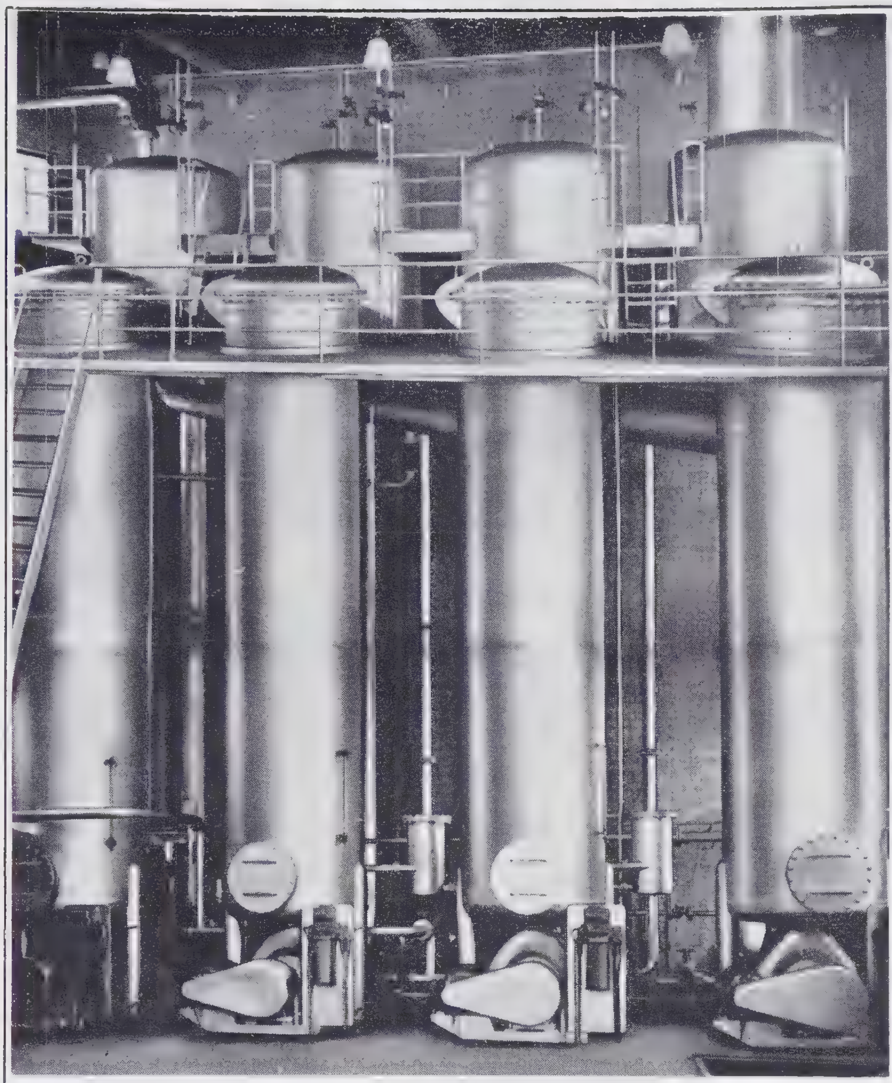

Hetland Quadruple Effect Evaporating Plant for Stickwater. Capacity: 30,000 kg/h stickwater (20,000 kg/h evaporated water).

Do you have

SCALING PROBLEMS

in your evaporating plant?

If the answer is YES, a HETLAND EVAPORATOR with forced circulation will solve your problems.

★

Forced circulation:

Prevents the scaling of the heating surfaces.
Improves the heat transfer.
Cuts down the operation costs.

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HETLAND EVAPORATING PLANTS are installed in the most modern Fish Meal Factories in Norway!

Our designs are in every detail made for the purpose of processing fish meals and fish oils with maximum output and without any loss of valuable vitamins.

For the planning of new factories in the Fish Meal and Fish Oil Industry—or for the modernizing of old ones—please apply to our Planning Department.

THE HETLAND EQUIPMENT PAYS!

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BRYNE - NORWAY

TELEPHONE: BRYNE 81027 — CABLE ADDRESS: HETLAND

We also manufacture:

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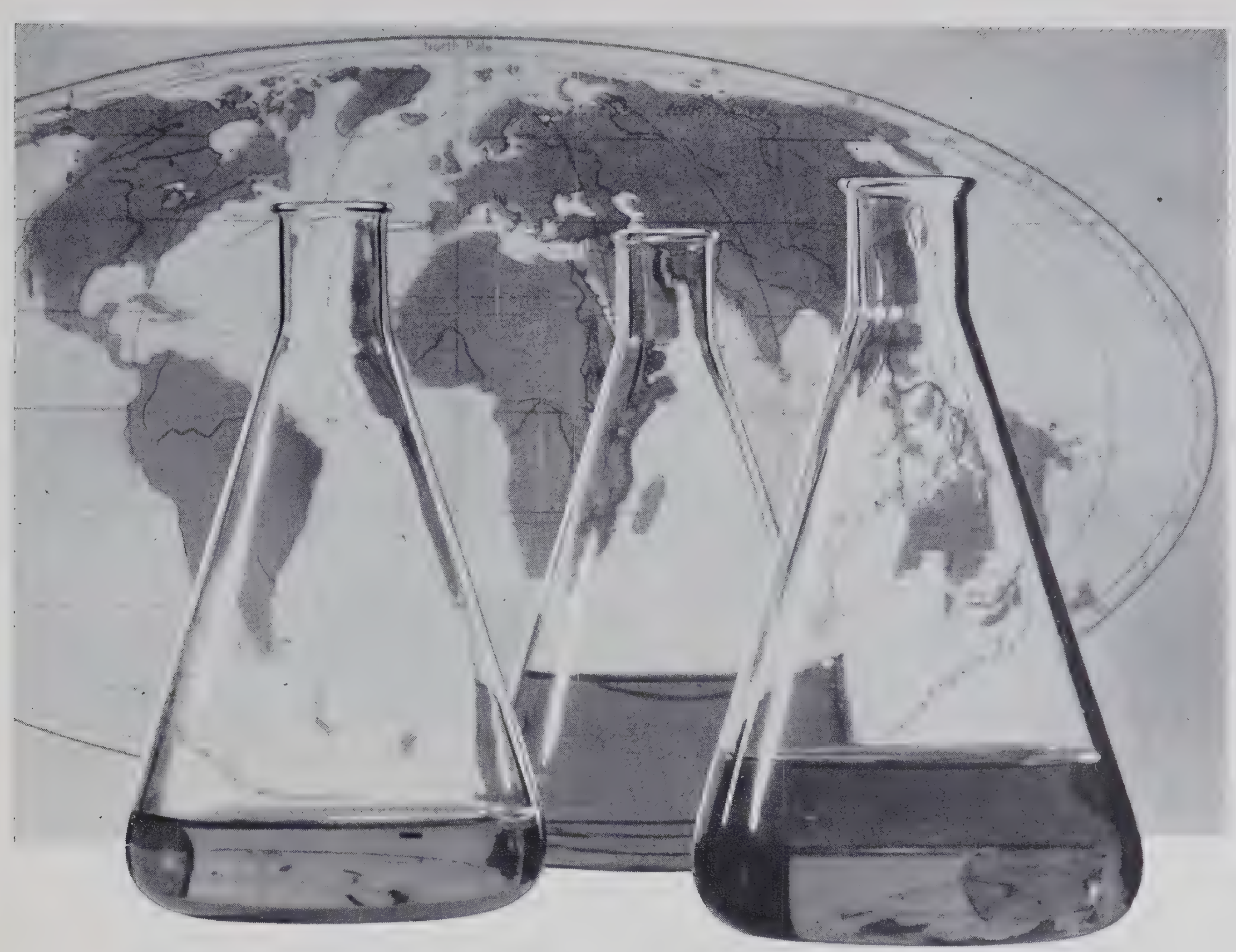
- Indirect Steam Tube Dryers.
- Indirect Cookers for Fish.
- Adjustable Screw Presses.
- Wet Mills for Press Cakes.
- Wet Screens for Press Liquids.
- Hammer Mills.
- Dry Screens.
- Automatic Unloading Plants for Fish.
- Transport Equipment.



Through research to progress

A/S DENOFA OG LILLEBORG FABRIKER is one of Norway's largest industrial concerns employing more than 1,500 persons. It owes its present status not least to systematic and intensive research, and has developed products which are in demand all over the world.
A/S DENOFA OG LILLEBORG FABRIKER refines and hydrogenates more than 150,000 tons of whale, herring, and vegetable oils annually, and since 1912 has exported its oil and fats to all parts of the world.
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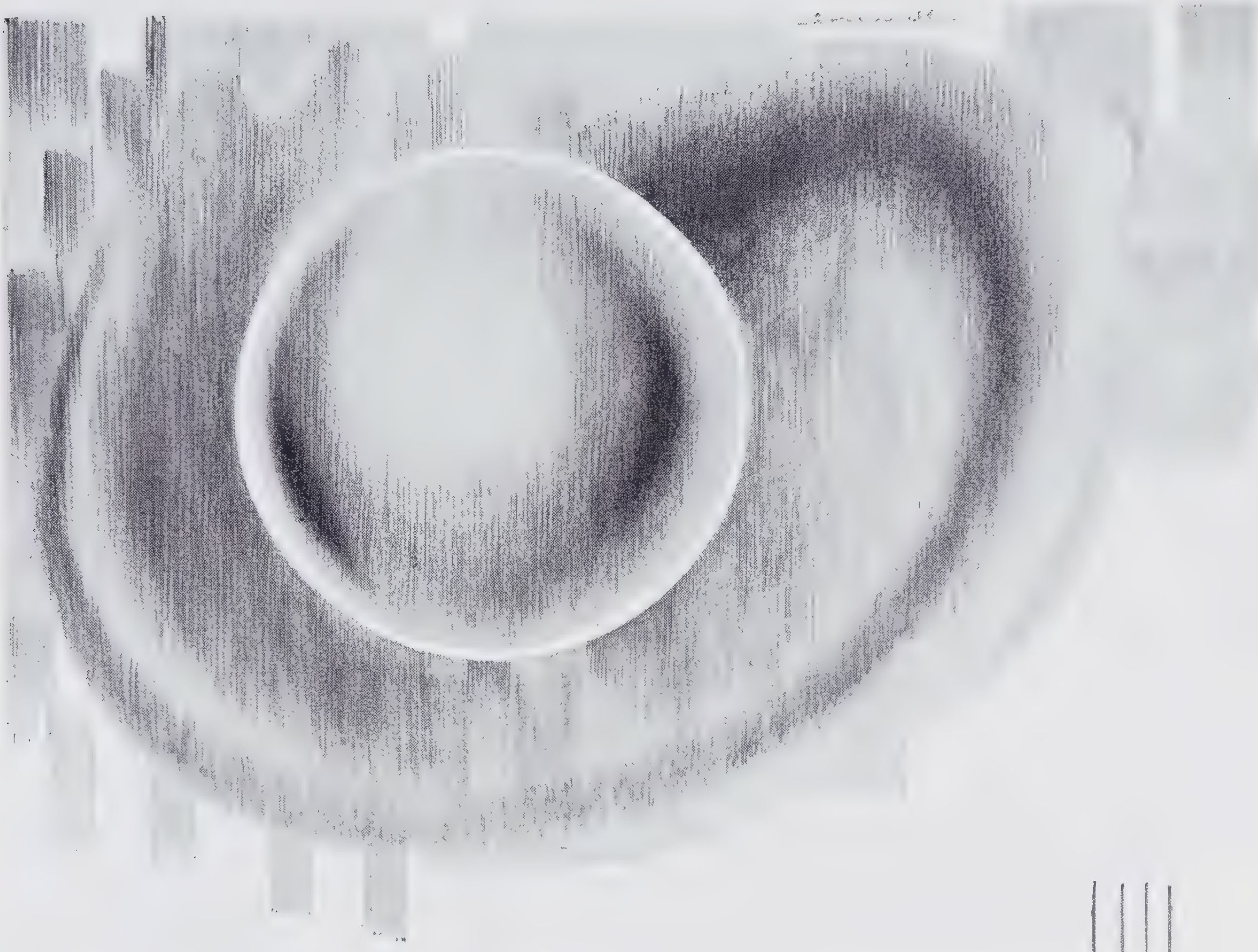
A/S DENOFA OG LILLEBORG FABRIKER

WORKS: FREDRIKSTAD — HEAD OFFICE: OSLO — TELEGRAPHIC ADDRESS: DENOFA

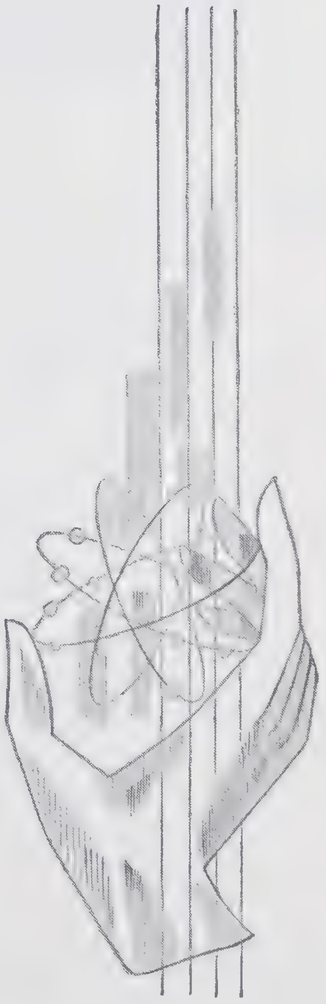


The future is shaped to-day

The future lies in growth—the company's growth in relation to the ordinary economical growth. More effective production methods and improved products give a better standard of living, both for you and us.

Since the war, Norsk Hydro has invested £70 million in new factories and in increasing the efficiency of the old. The production of nitrogen products is now more than tripled. New products have been introduced, and the company has amongst other things become the largest producer of magnesium metal in Western Europe.

Norsk Hydro is to-day engaged in the most extensive investment-programme in the history of the company. During the next five-year period the company reckons to invest further nearly £50 million for the extensions of the power, nitrogen, light metal and organic-chemical sections.



NORSK HYDRO

HEAD OFFICE: BYGDÖY ALLÉ 2, OSLO, NORWAY

1917

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Works at Ålvik producing:

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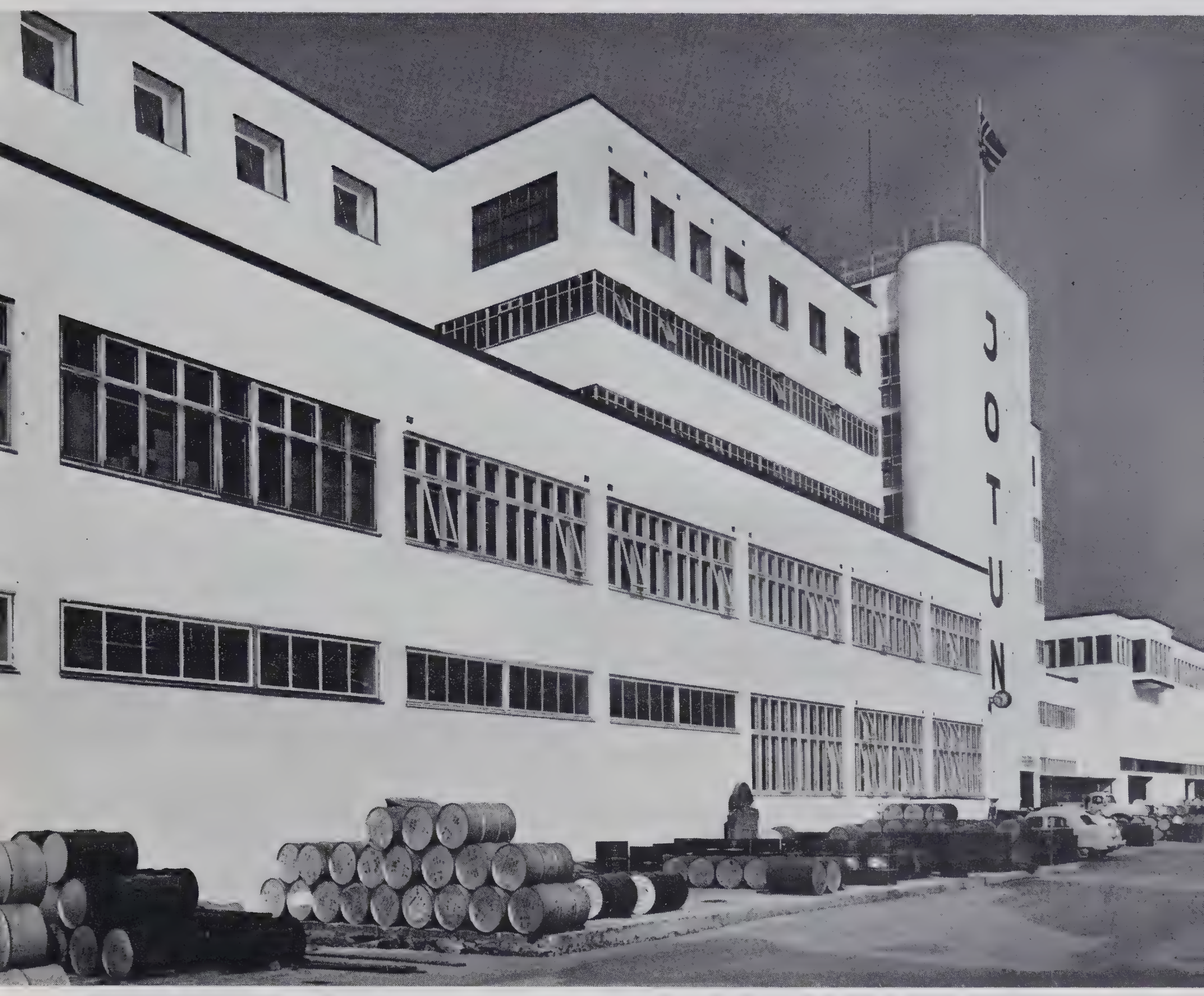
Presenting Jotun



– Norway's biggest paint factory

Jotun Fabrikker A/S yearly produce about 12,000 tons of paints and varnishes. About 55 per cent of the annual production is absorbed by the home market whilst the remaining 45 per cent is sold abroad. Jotun's products cover almost the entire range of paints and varnishes, with these outstanding consumer groups:

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JOTUN
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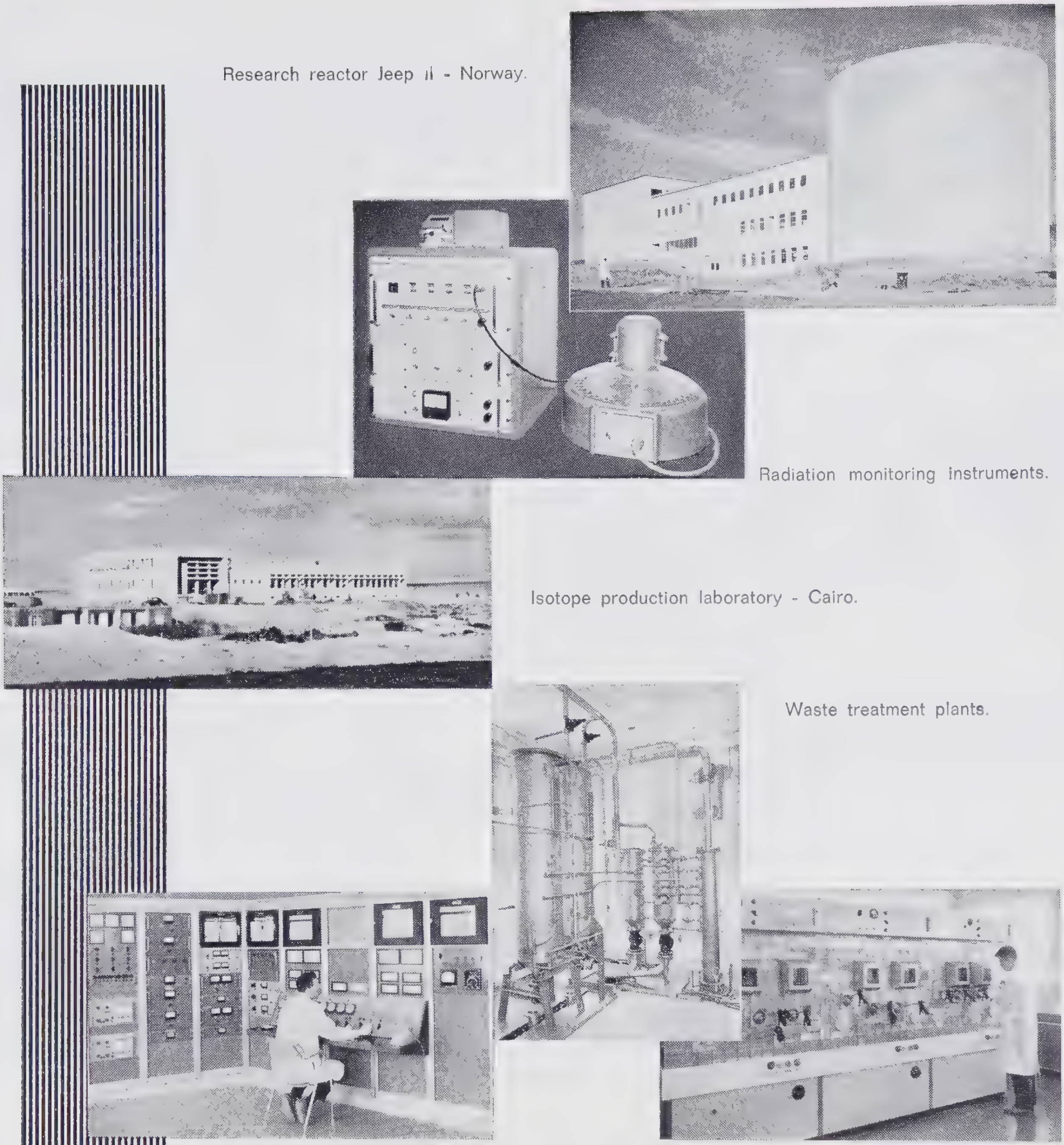
SANDEFJORD

The Penguin is the trademark of all Jotun products.



Research reactor Jeep II - Norway.

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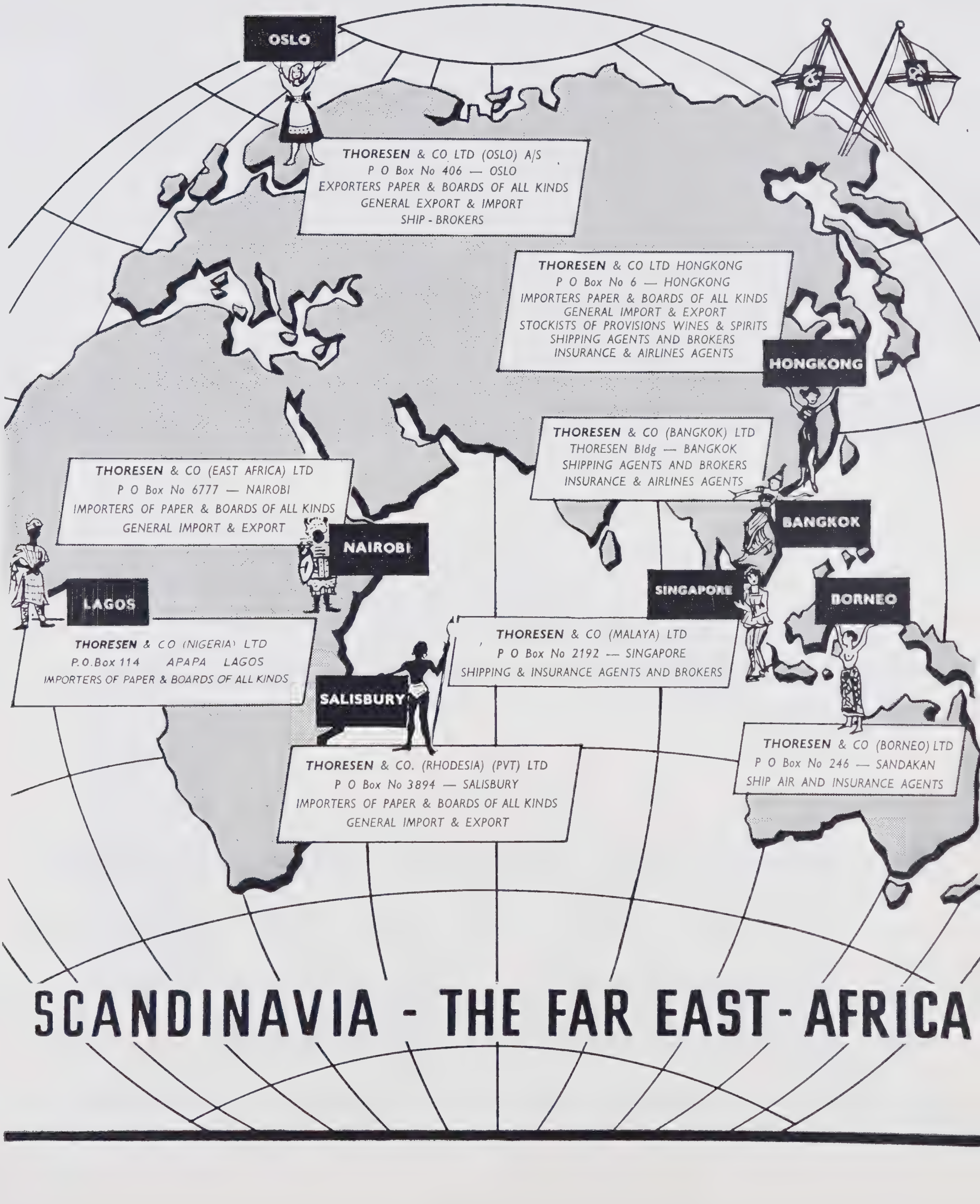

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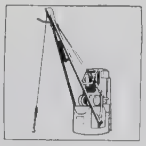
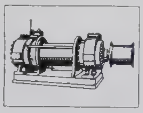
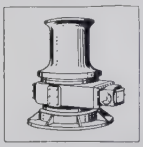
This 2nd bulk carrier from the same yard having complete HYDRAULIK deck machinery is equipped with:







4 HYDRAULIK deck cranes, 8 tons x 18 m. turning radius for grab operation.

1 HYDRAULIK windlass for 71 mm H. T. anchor chain.

4 HYDRAULIK self tensioning mooring winches, 12 tons.

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Where reliability and silent operation is most important HYDRAULIK low pressure deck machinery is the right equipment.

HYDRAULIK deck machineries are on order for approximately 150 ships aggregating 1.000.000 t. dw. in 22 countries on all continents.

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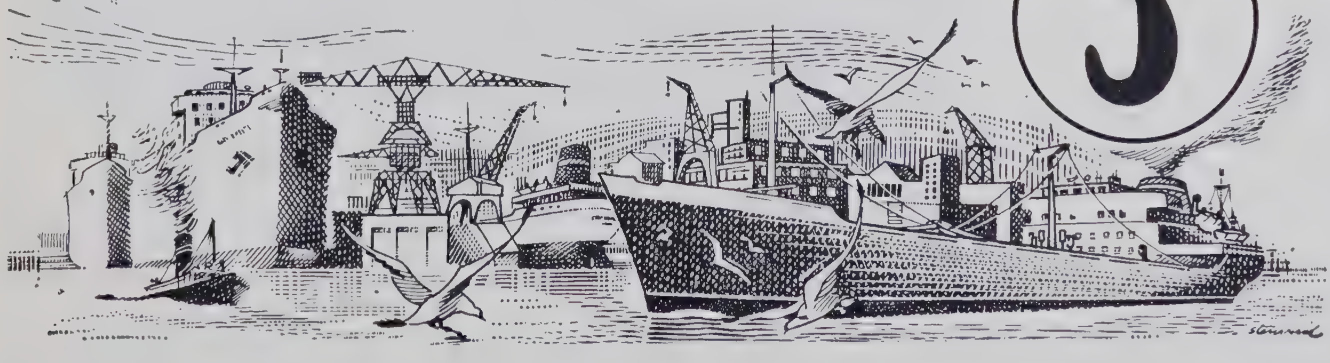

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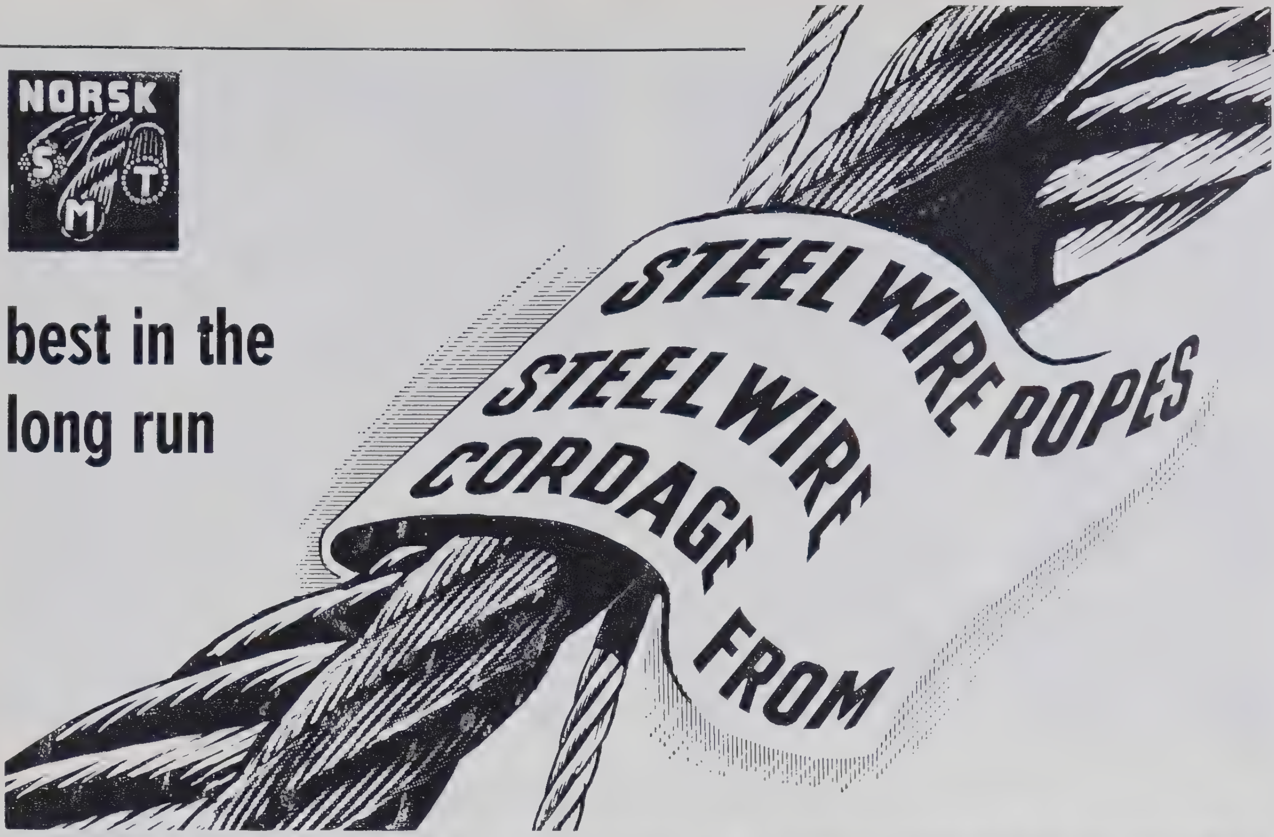

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TRONDHEIM - NORWAY

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The oil refineries.

Cod liver oils (medicinal and veterinary).
Refined, hydrogenated and deodorized
Whale oil,
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Pristane - Cetaceum.
Sperm oils (crude, filtered and hydrogenated.
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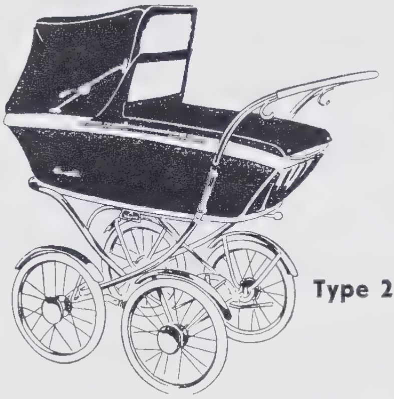
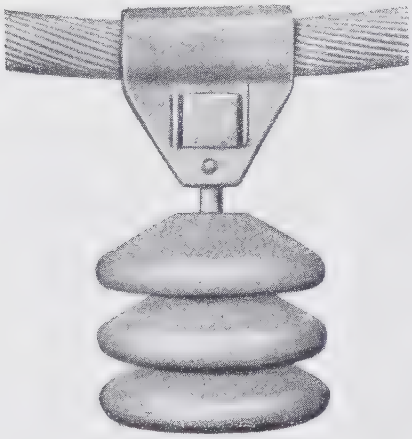


Type 205 «Crystelle»



«Elgra» damper

AGAINST VIBRATION OF TRANSMISSION LINES

- ★ The damper is produced according to Dr. Eng. C. Granborg's patent.
- ★ The damper can be used for all steel, aluminium cable steel reinforced (ACSR) and for copper conductors.
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- ★ All steel parts are hot dipped galvanised.
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- ★ Vibration diagrams are made under the control of Swedish State Power Board, Stockholm.
- ★ On making an inquiry or ordering please state type of conductor, overall diameter and weight per foot.

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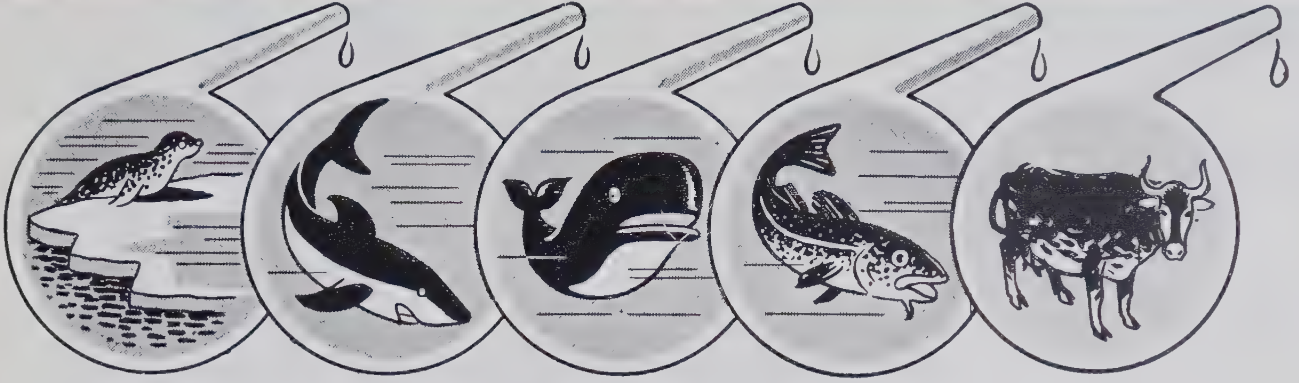

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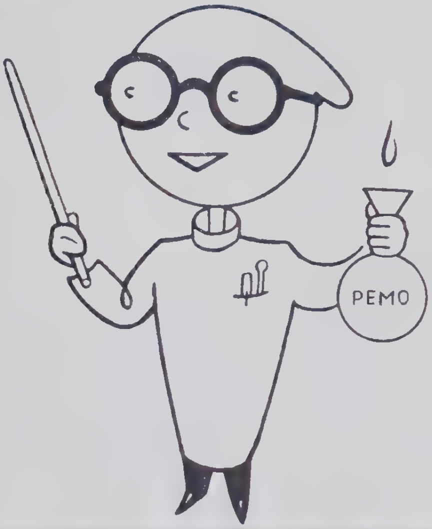

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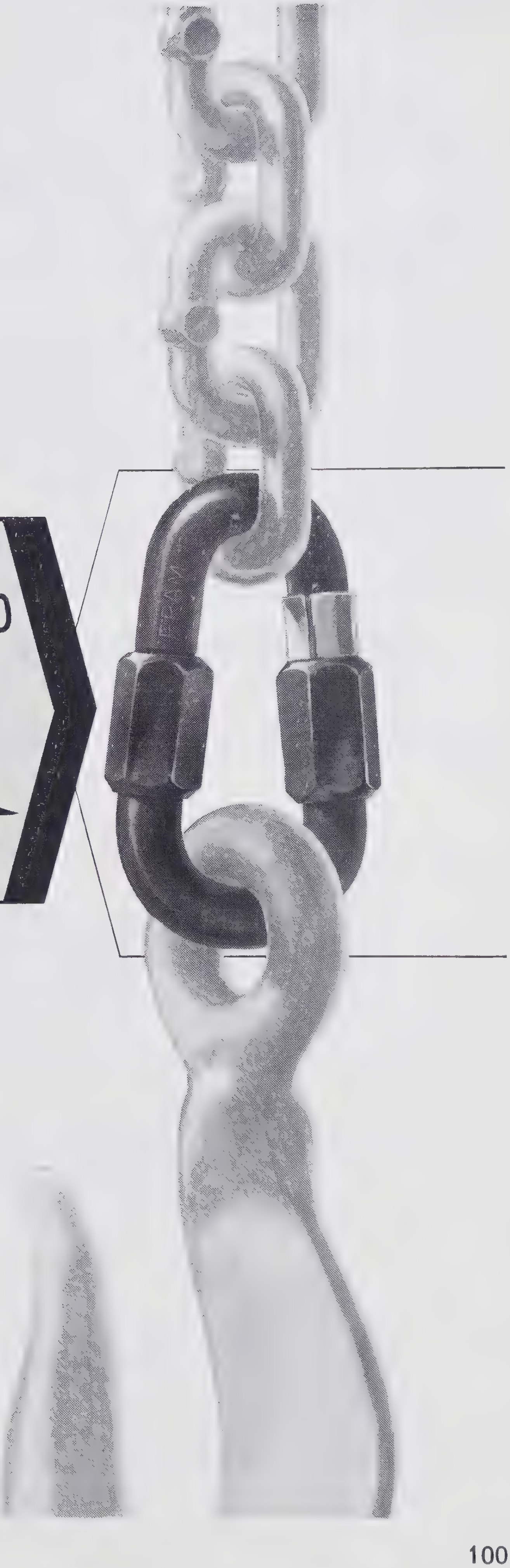

Chain

and

attachments

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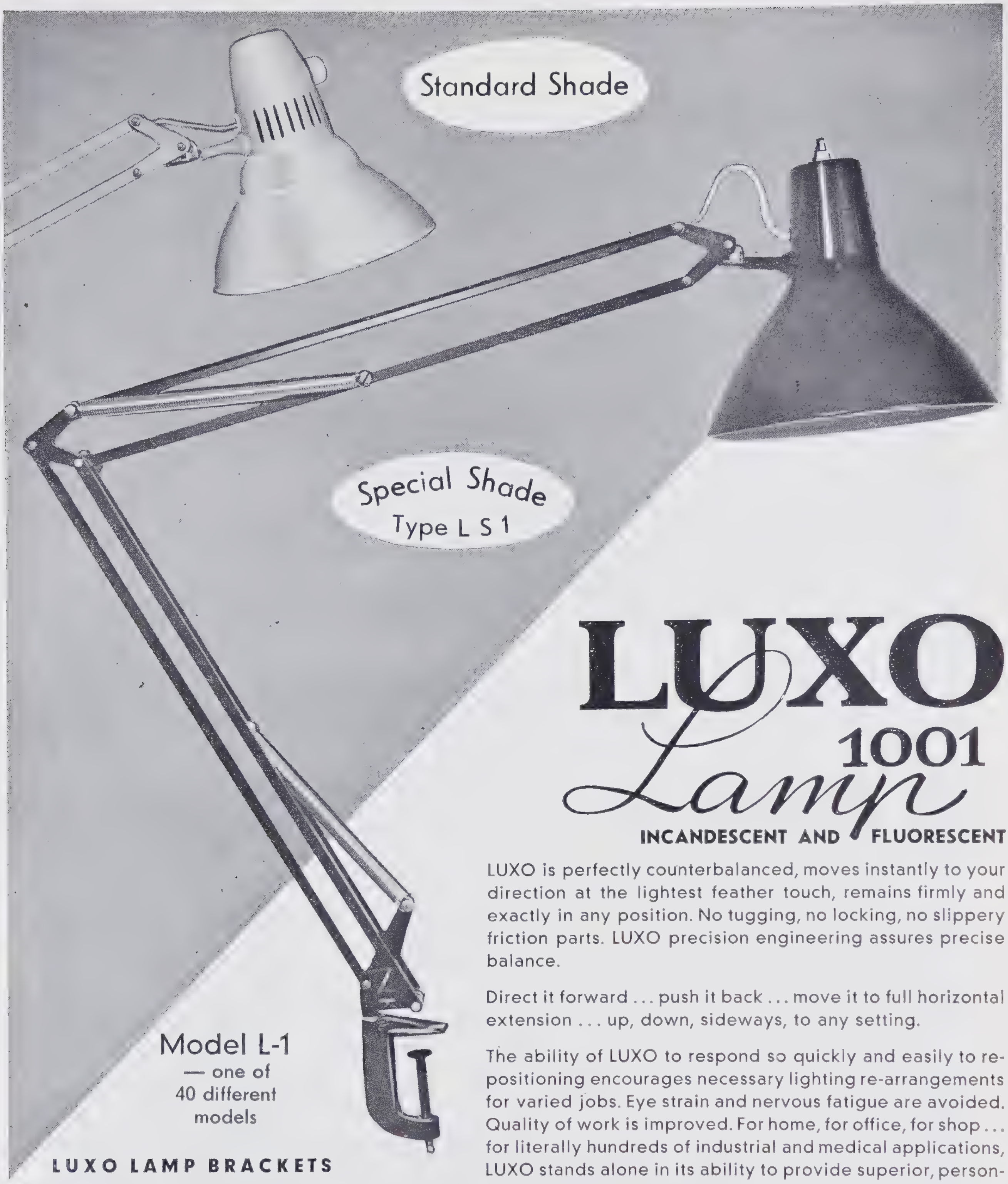

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— one of
40 different
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1001 Lamp

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LUXO is perfectly counterbalanced, moves instantly to your direction at the lightest feather touch, remains firmly and exactly in any position. No tugging, no locking, no slippery friction parts. LUXO precision engineering assures precise balance.

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Selected by Fortune Magazine as one of the 100 best designs of modern times.

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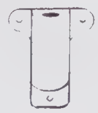
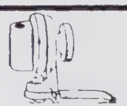
LUXO LAMP BRACKETS

A BRACKET A - Clamps to edge of table, desk or any horizontal surface.	B  BRACKET B - Screws to wall, partition or any vertical surface.
C BRACKET C - Screws to work bench, table or any horizontal surface.	D  BRACKET D - Screws to drafting table or any slanted surface, with adjustment to get lamp shaft in vertical position.

Originators:

Jac. Jacobsen a·s
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Det Norske Zinkkompani a/s

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capacity up to 45 000 tons dw.

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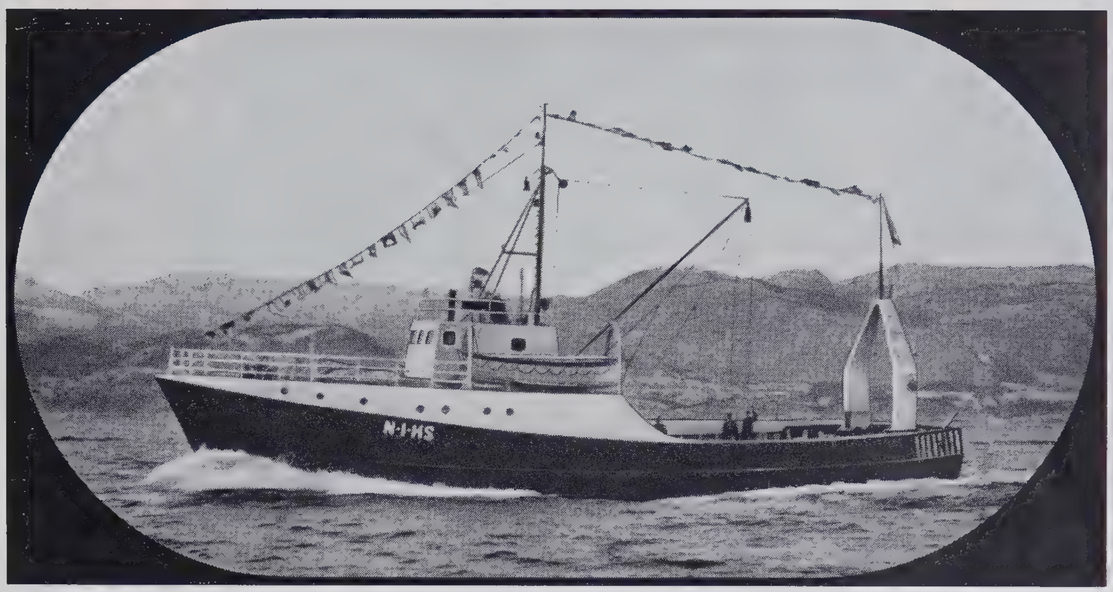

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MODEL DV3 with the eminent, world patented VACOMAT heating system

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SOMETHING BETTER ...

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- wherever space is limited.

A wide range of sizes and types of water heaters can be offered.

Manufacturers and exporters:

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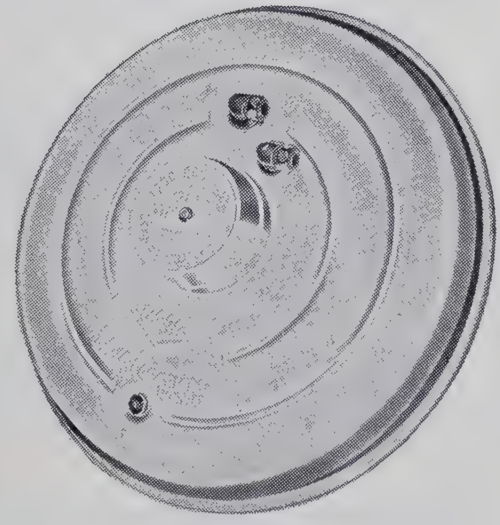
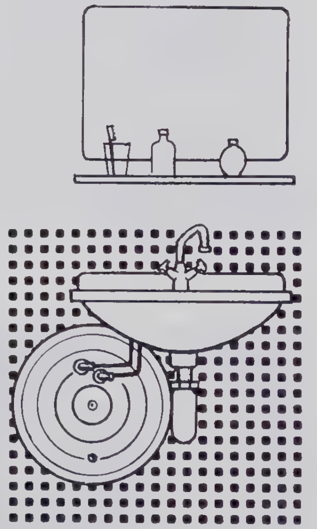
BERGEN - NORWAY





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SELLING ORGANIZATION FOR THE HERRING FISHERIES

HEAD OFFICE: BERGEN, NORWAY
District Offices: Aalesund - Haugesund
Cable address: «Samhald»

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Norway.
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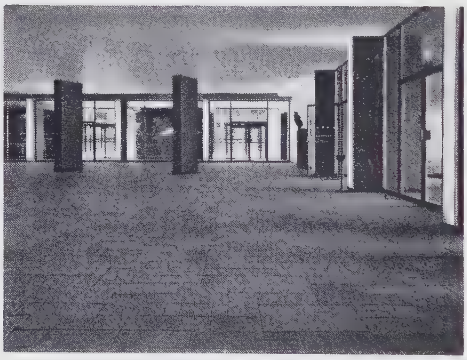

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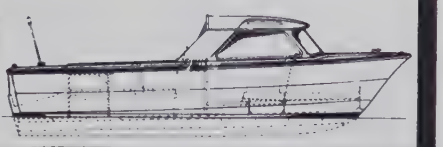

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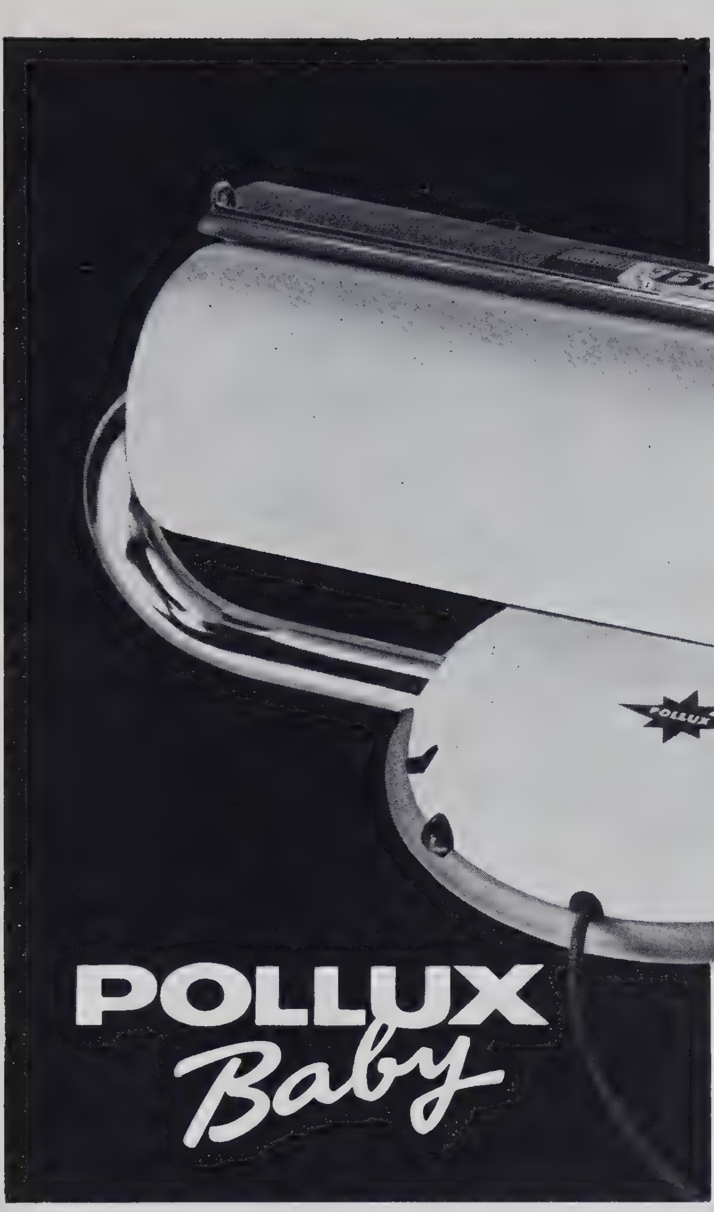

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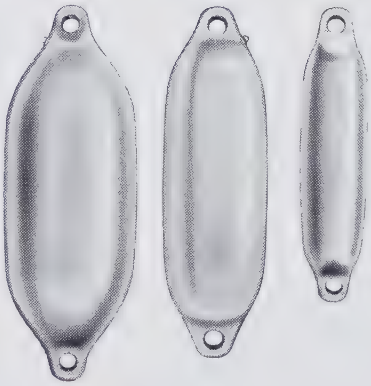

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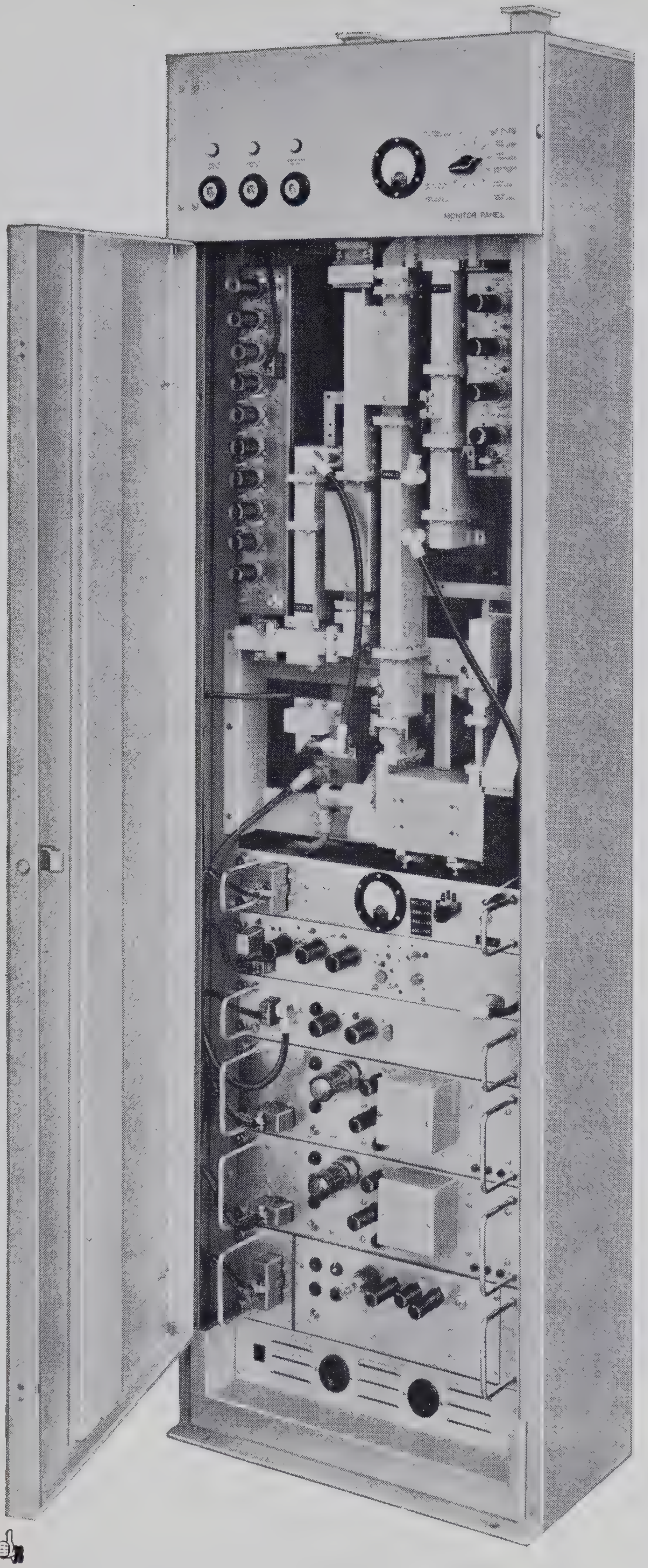

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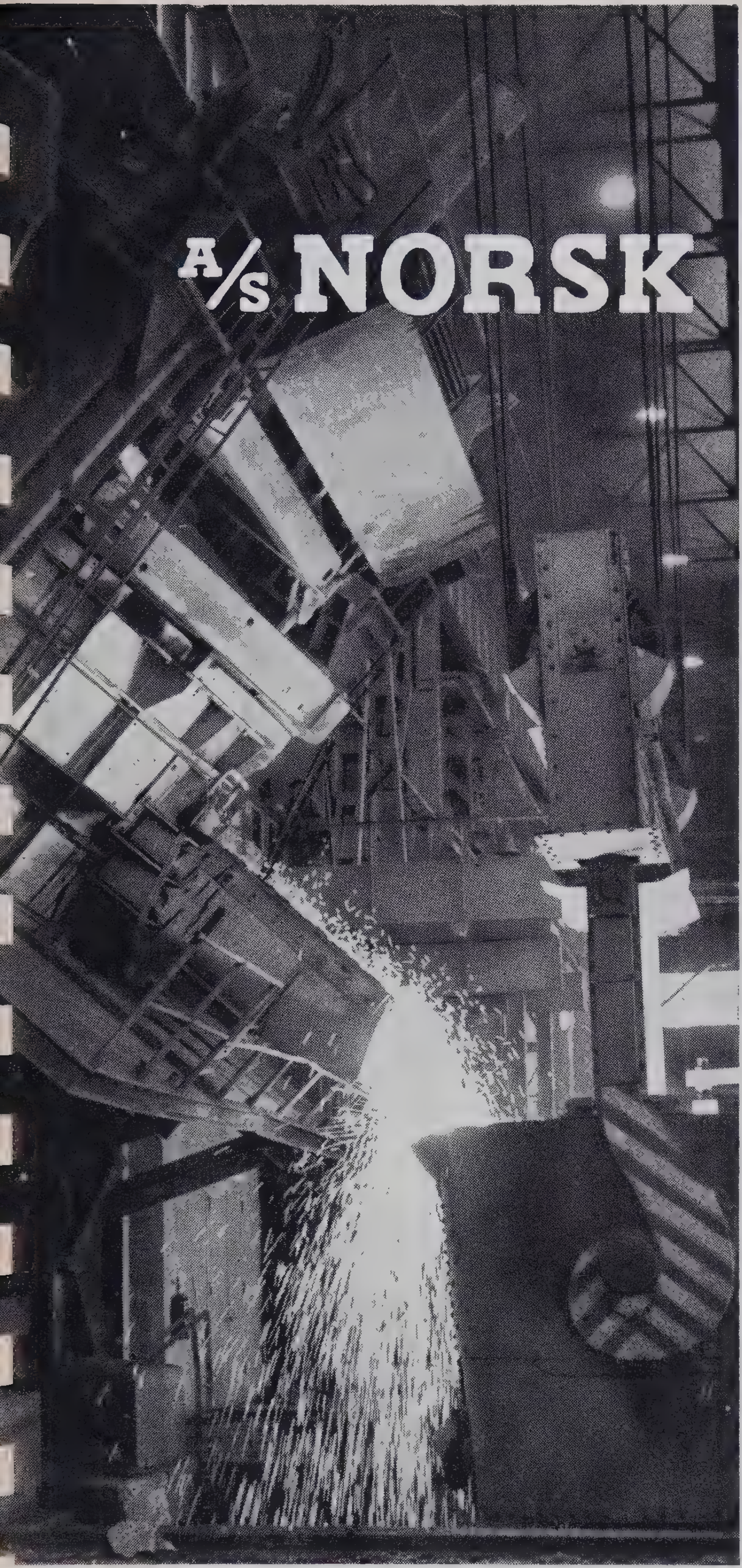

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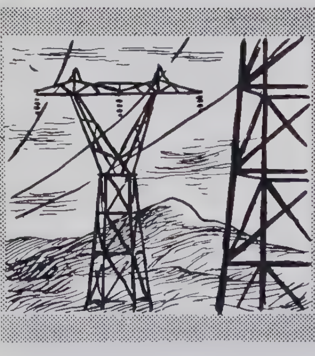
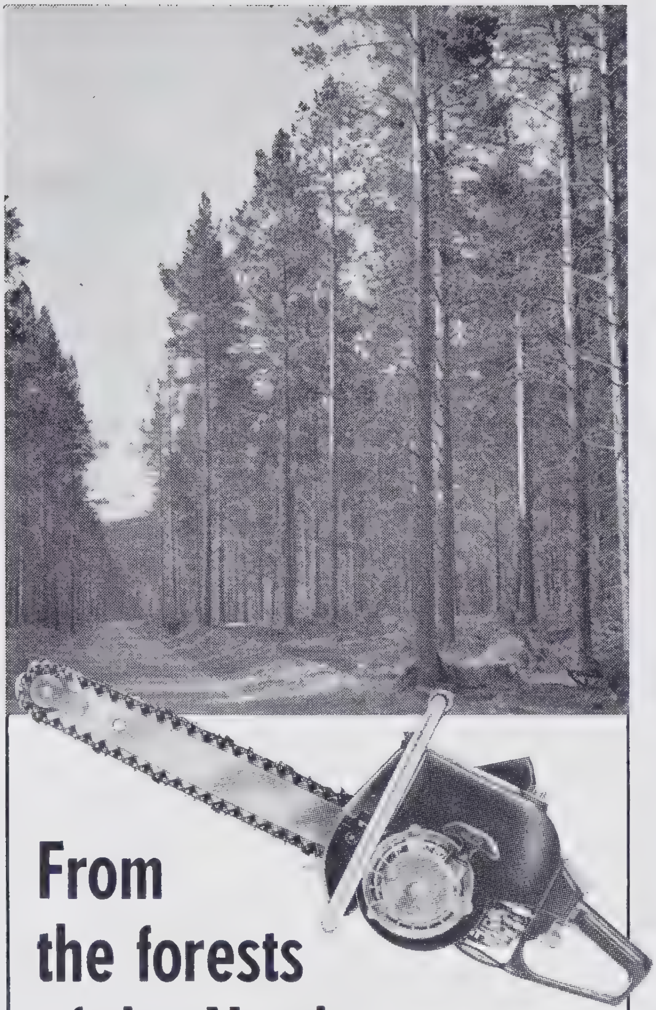


Power pylons

Construction



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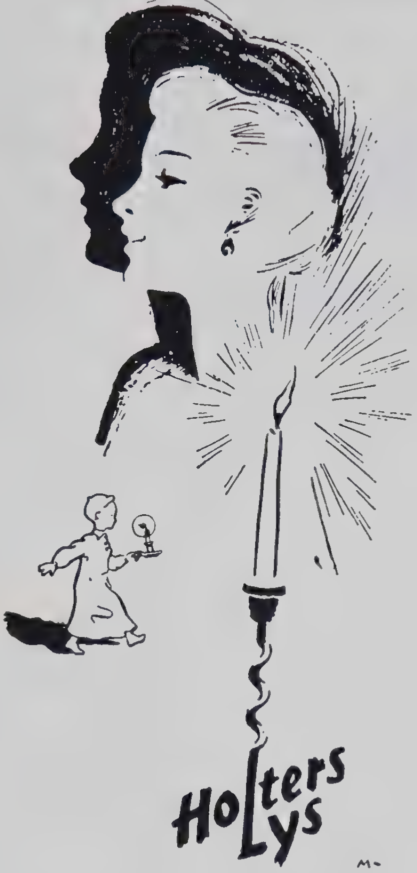

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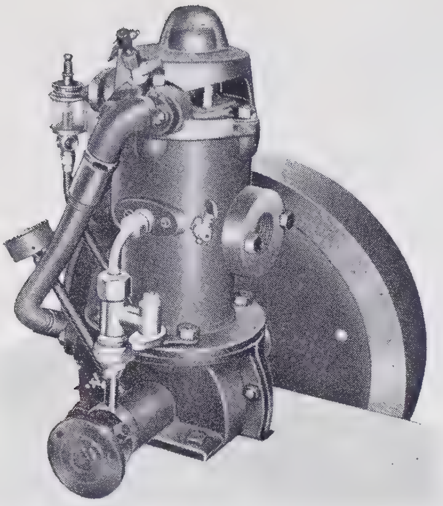

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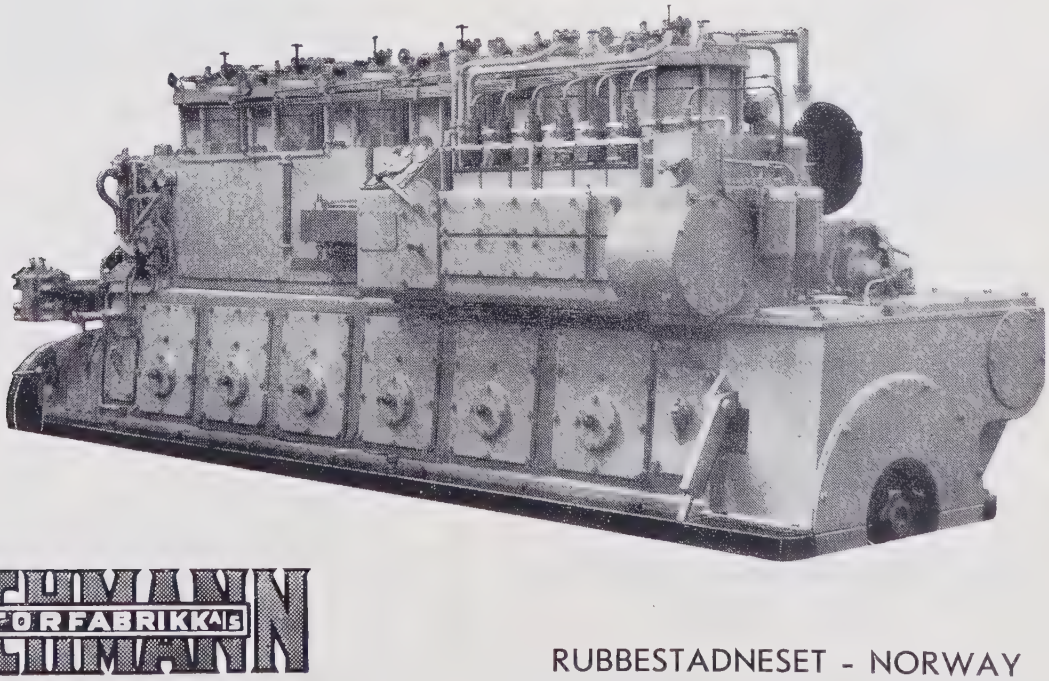

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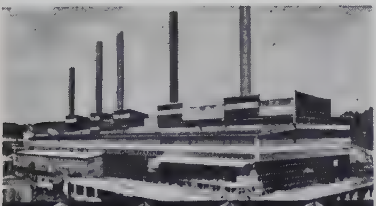

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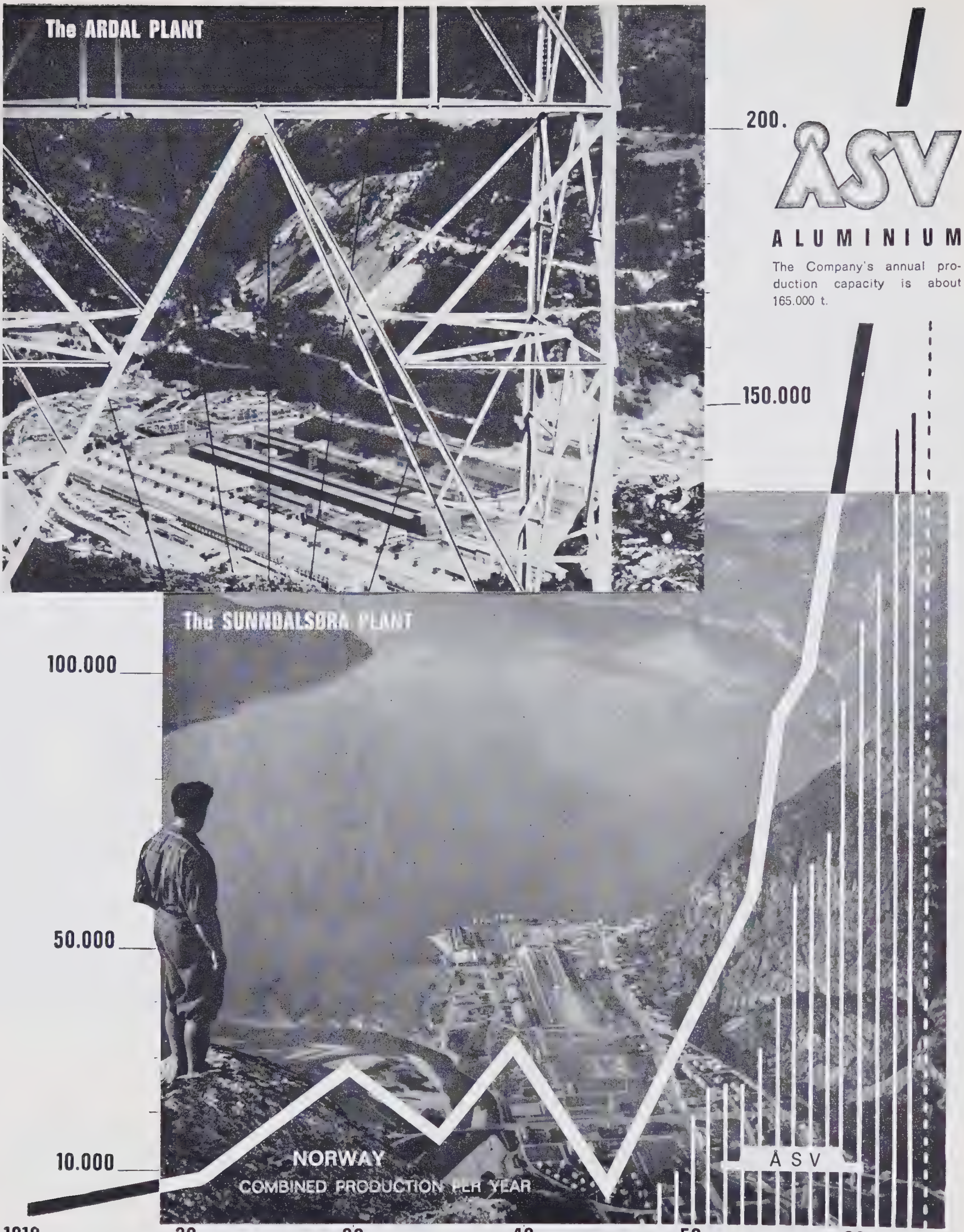

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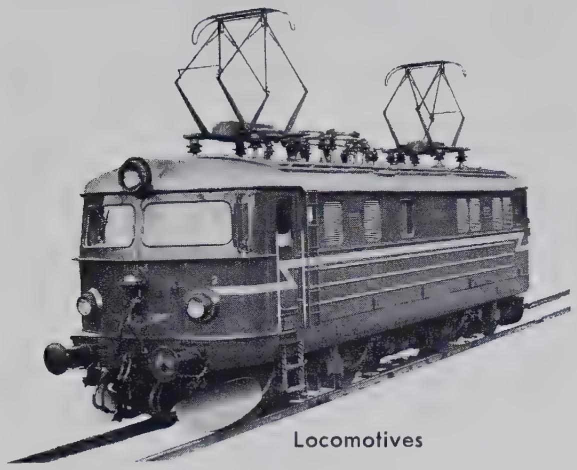
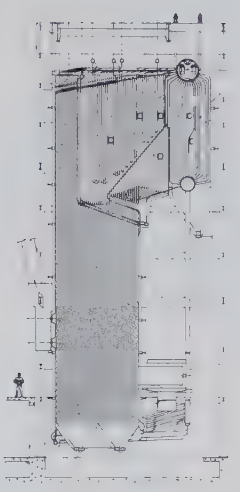


Locomotives



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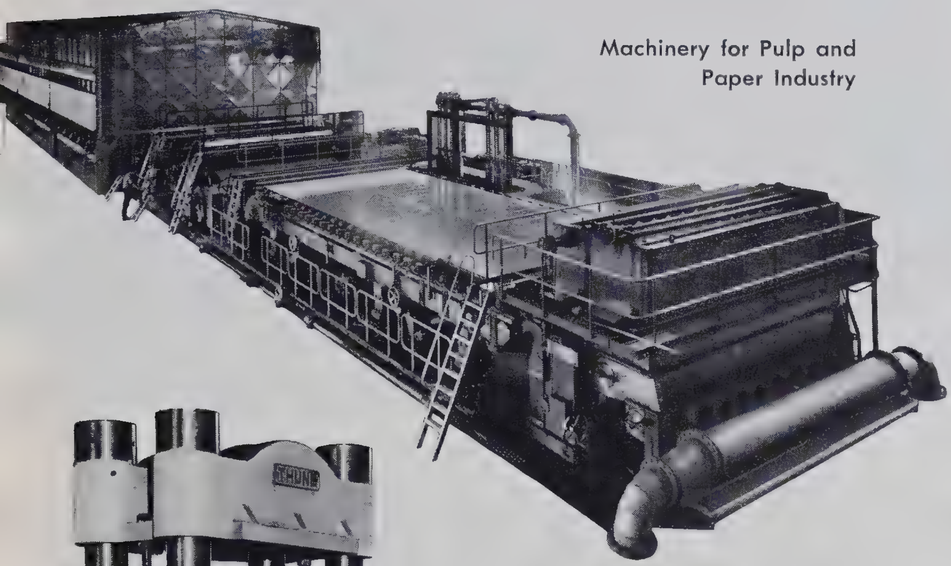

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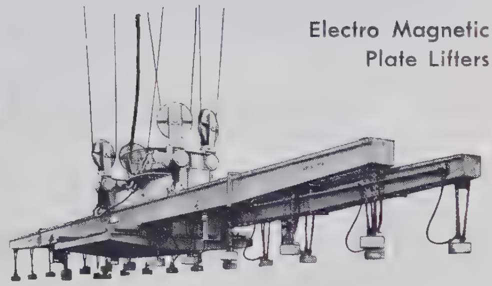

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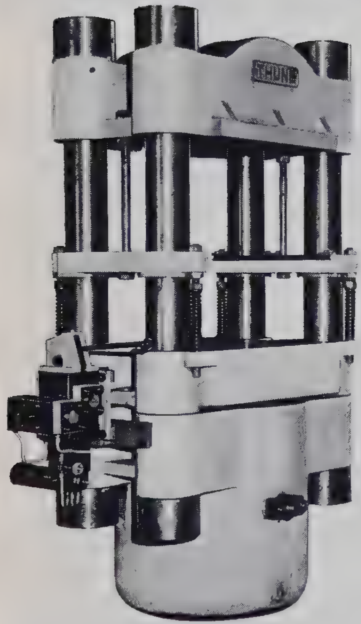

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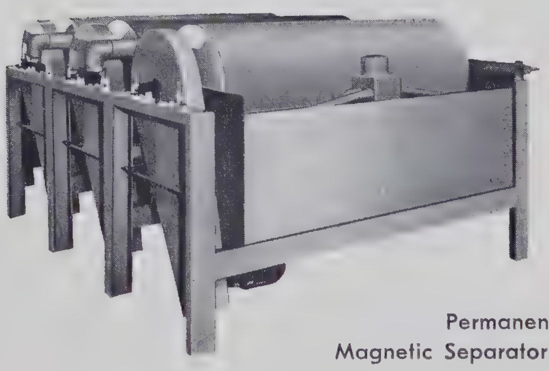

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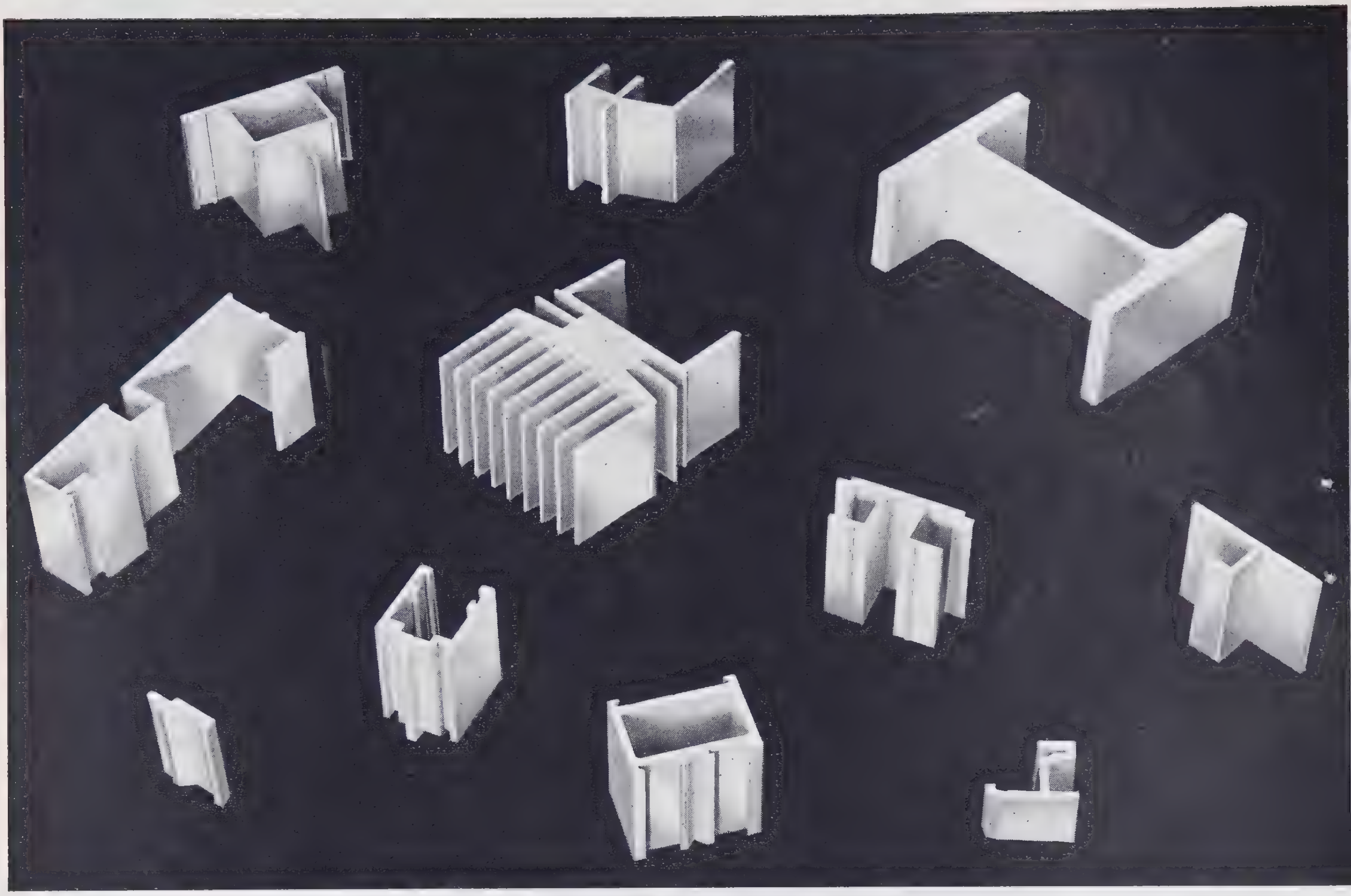

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- RAUFOSS designs and produces its own production tools.
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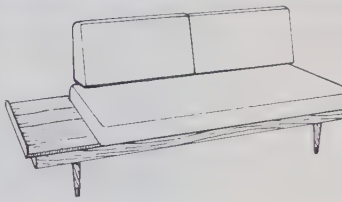

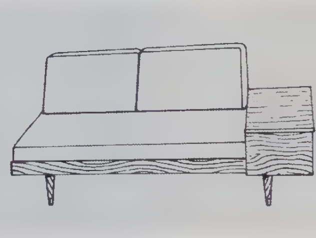

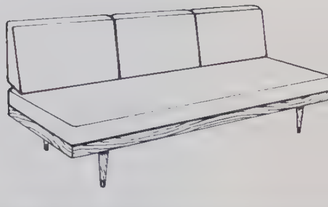

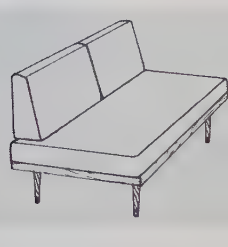

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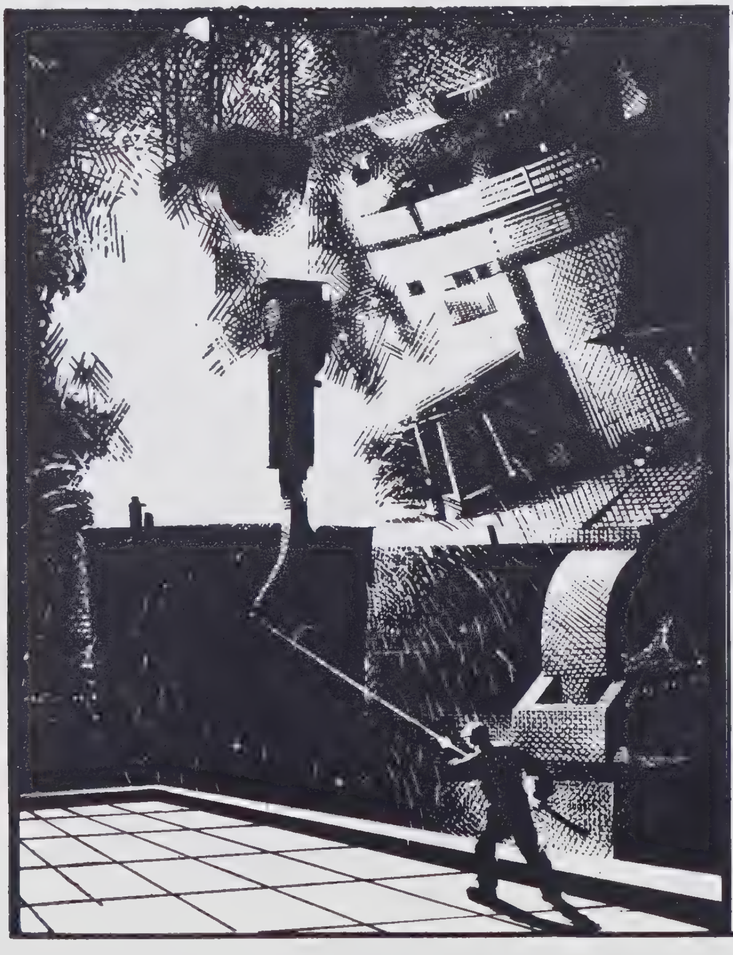

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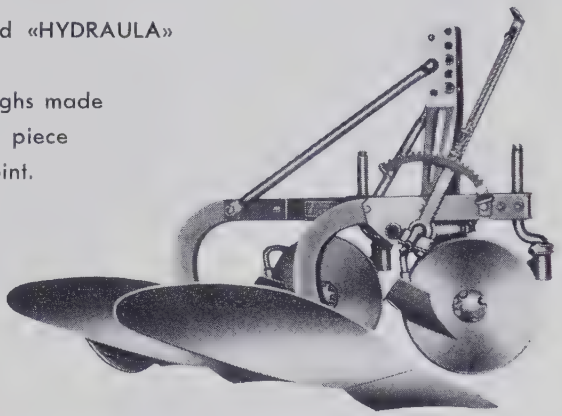

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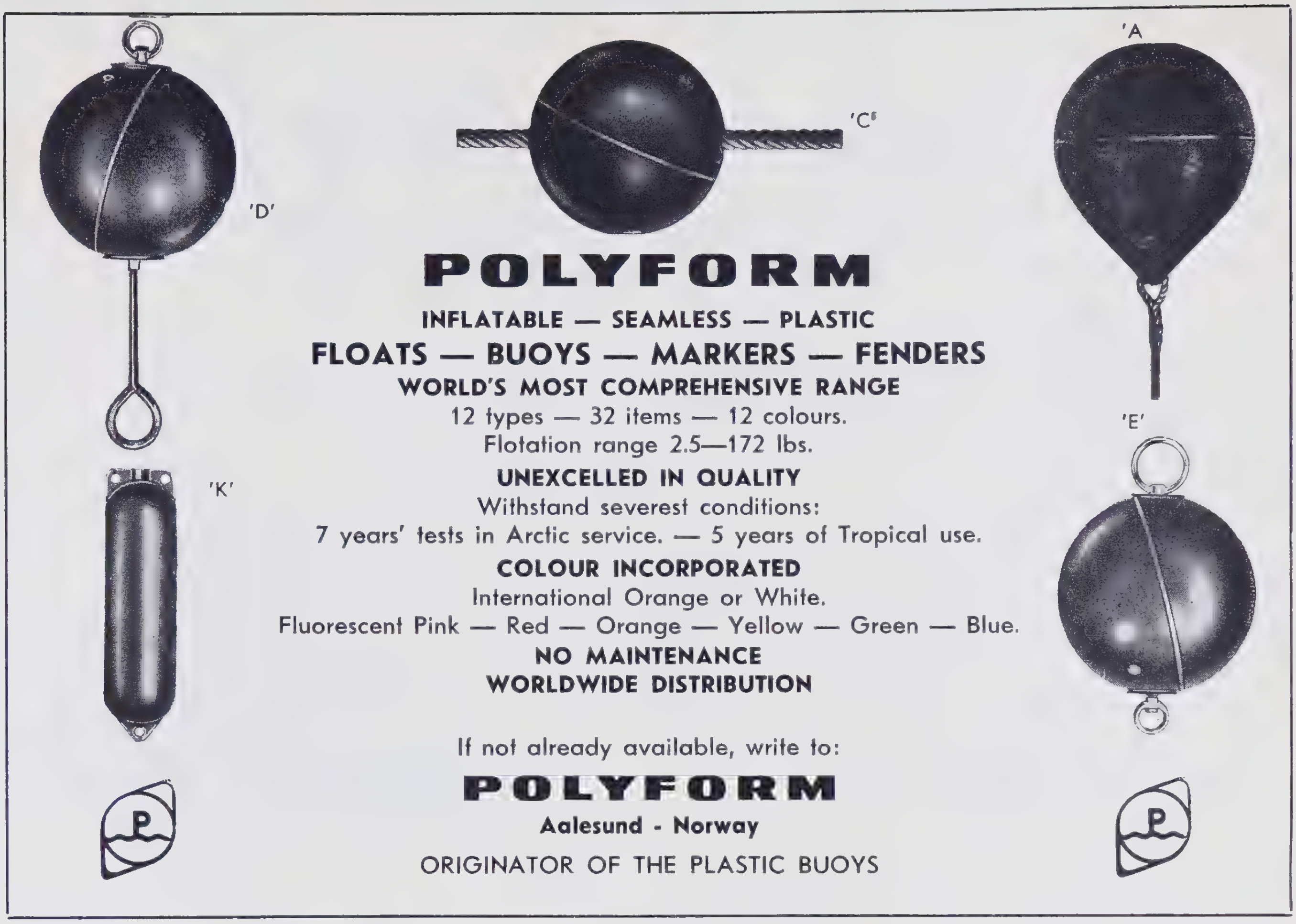

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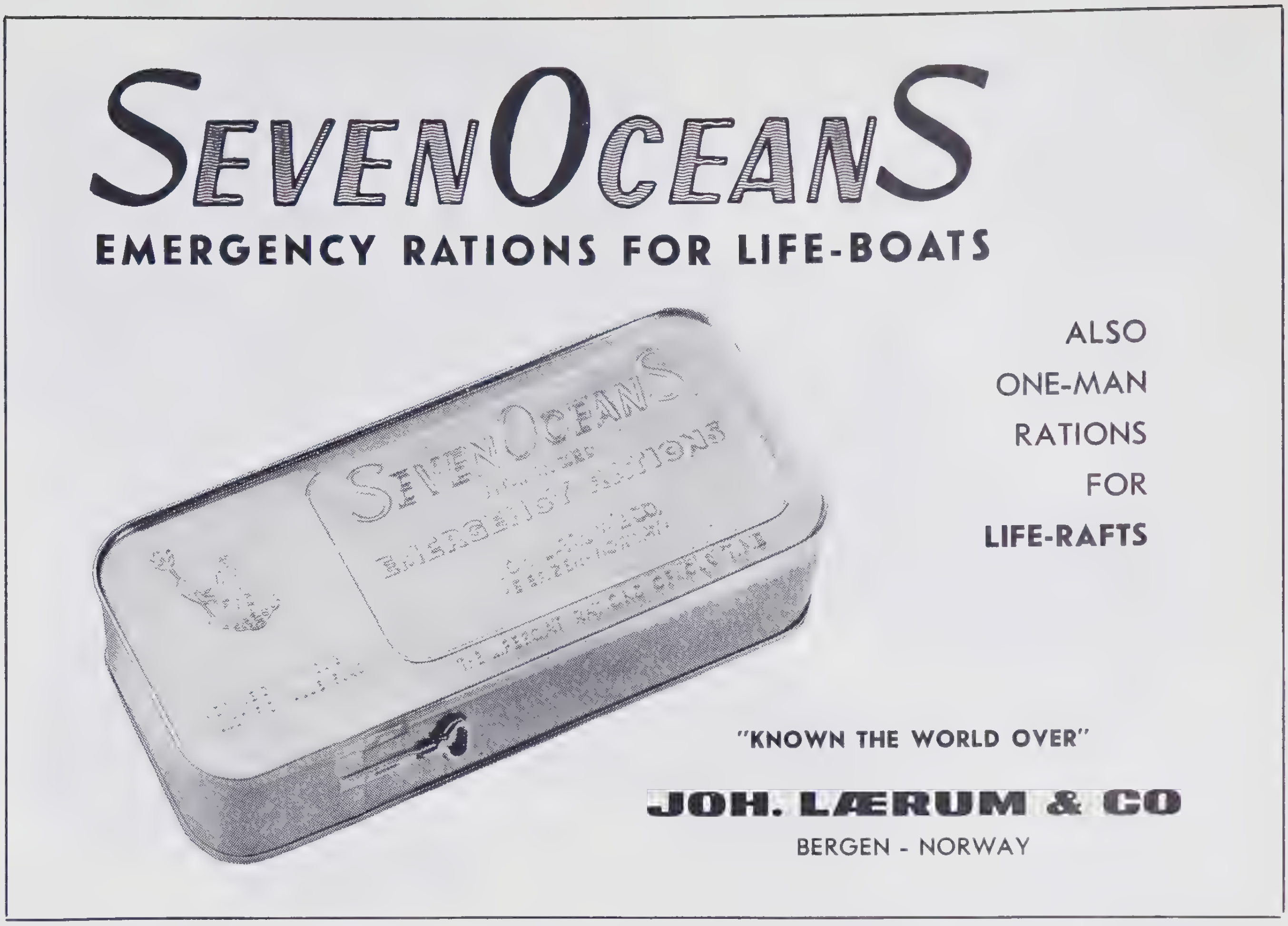

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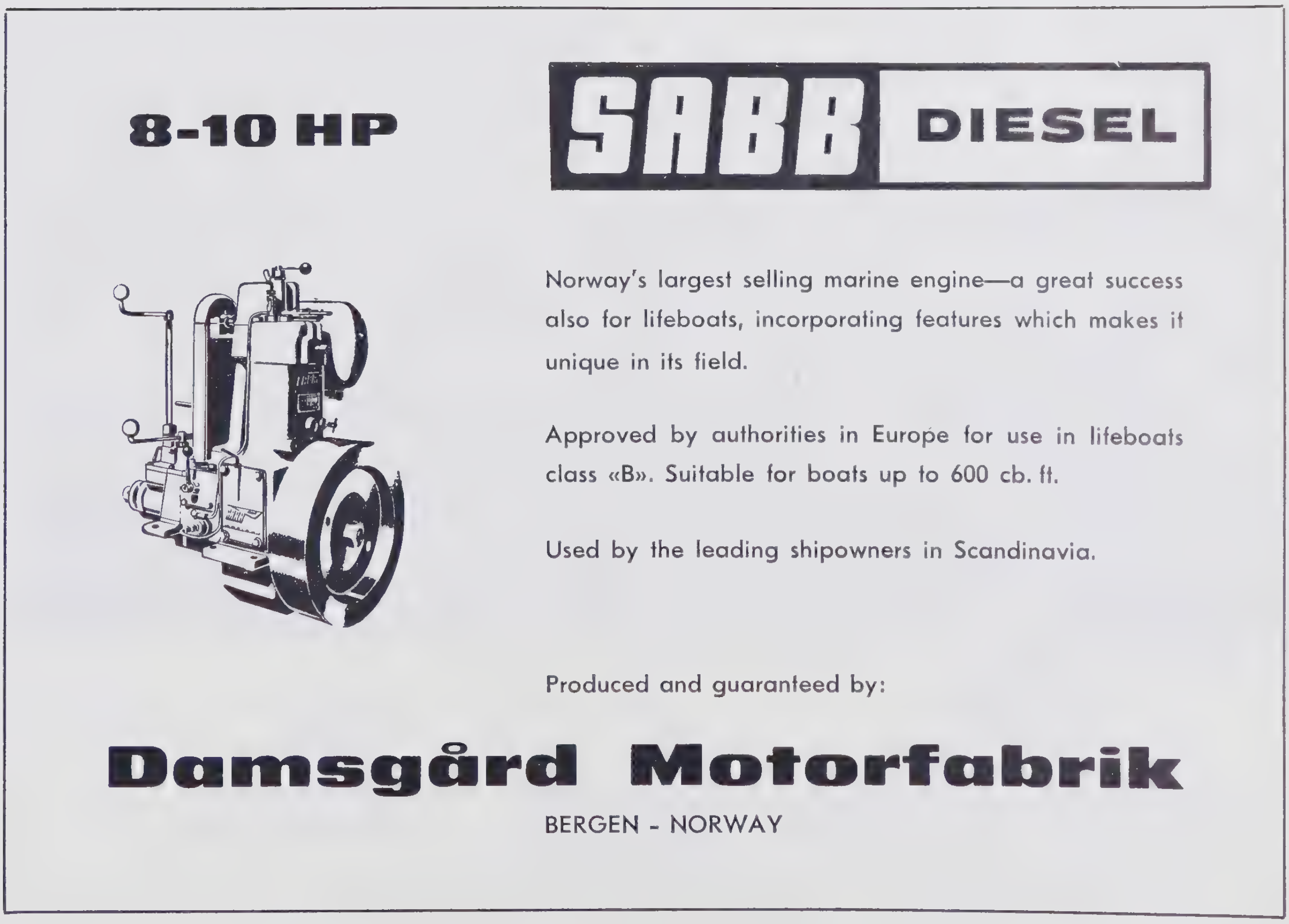

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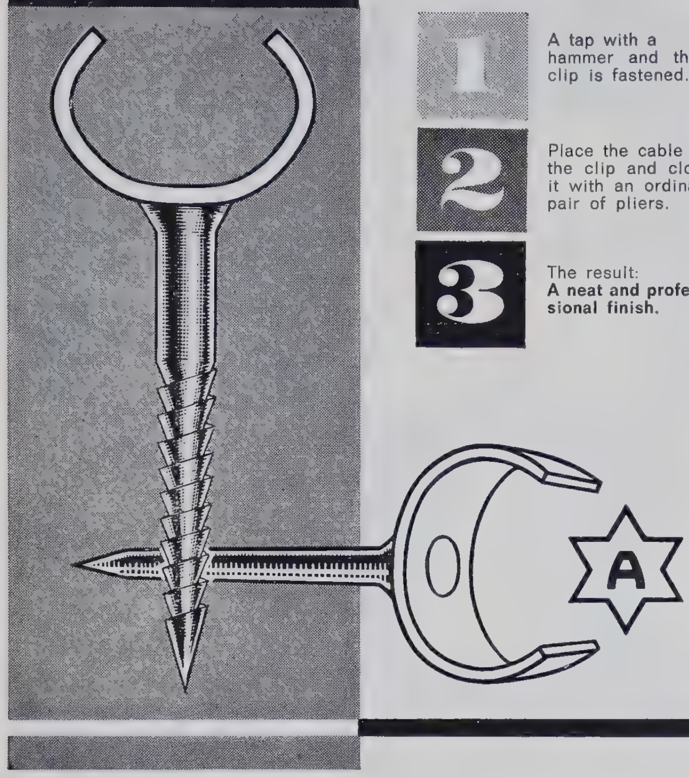

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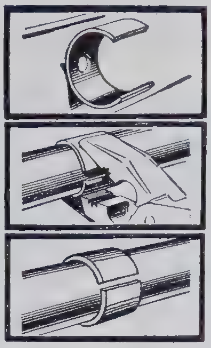

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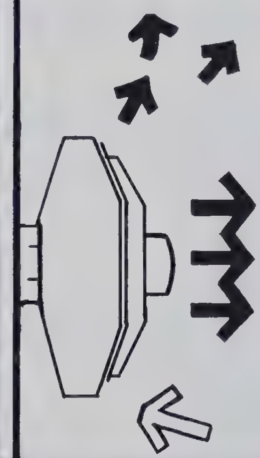

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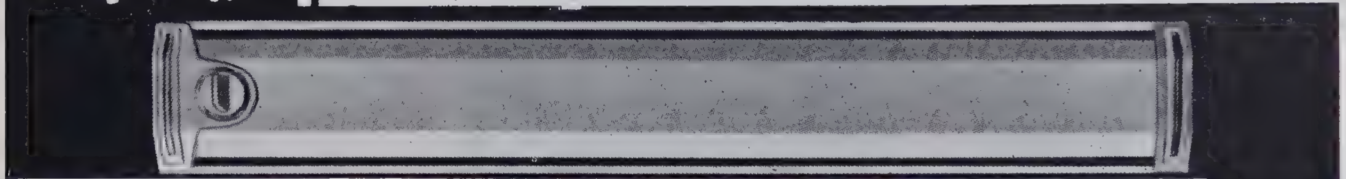

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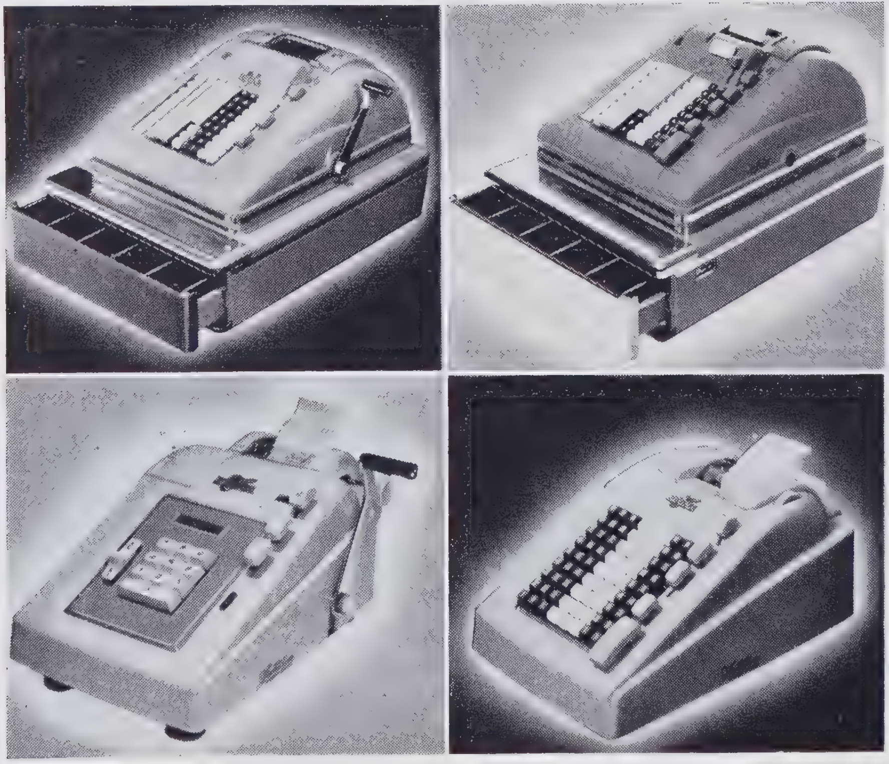

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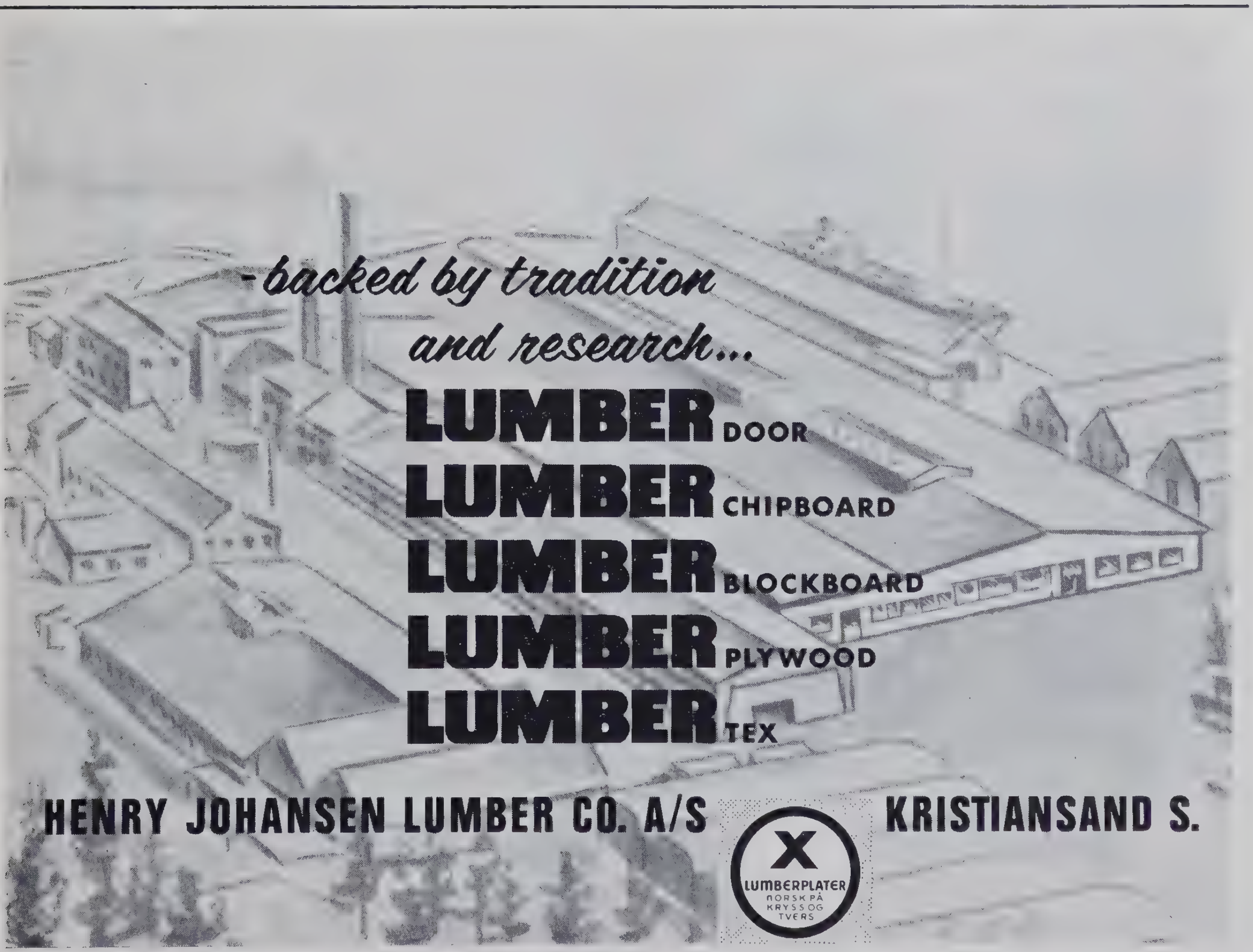

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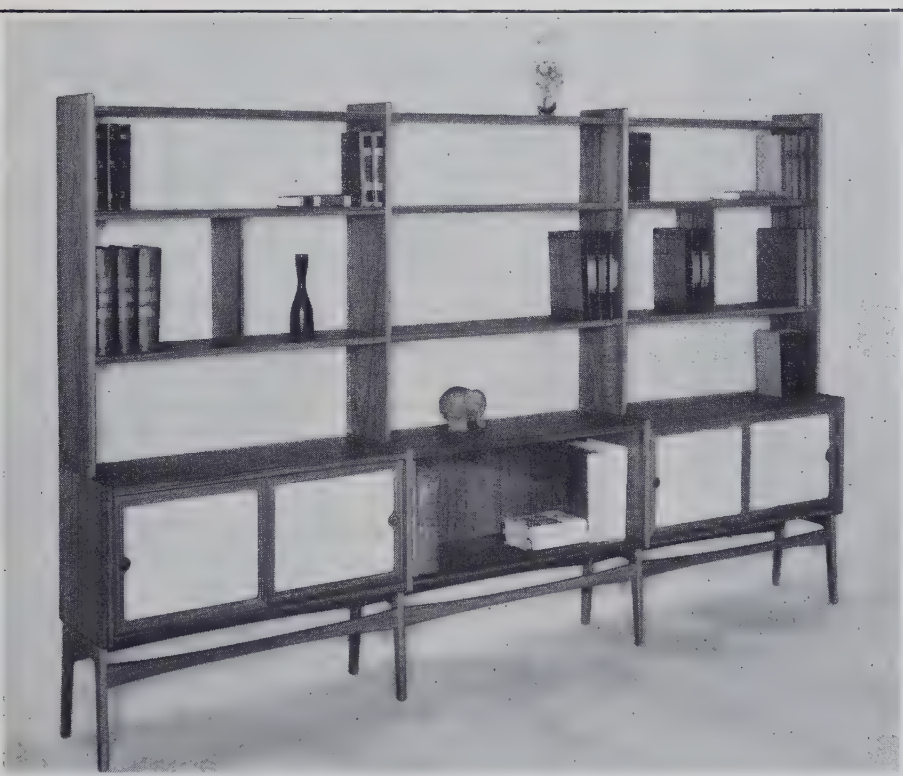

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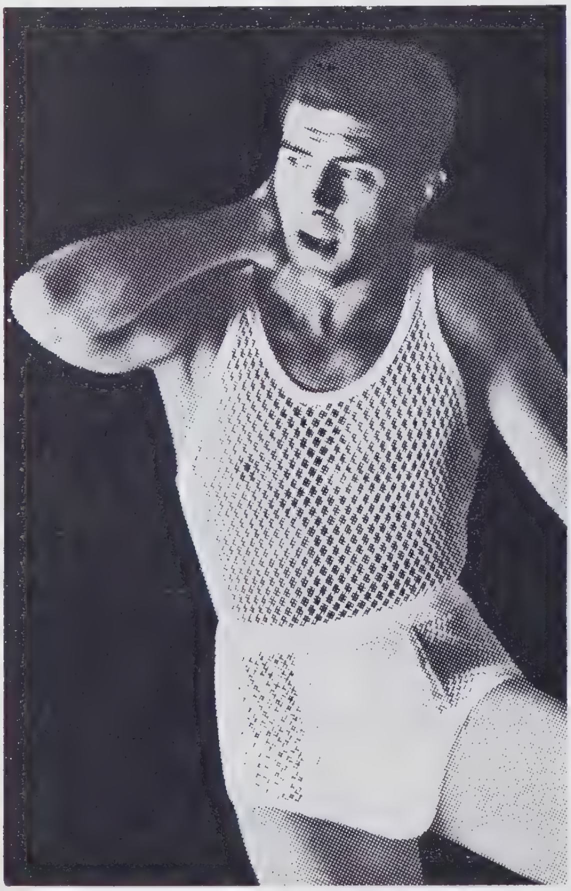

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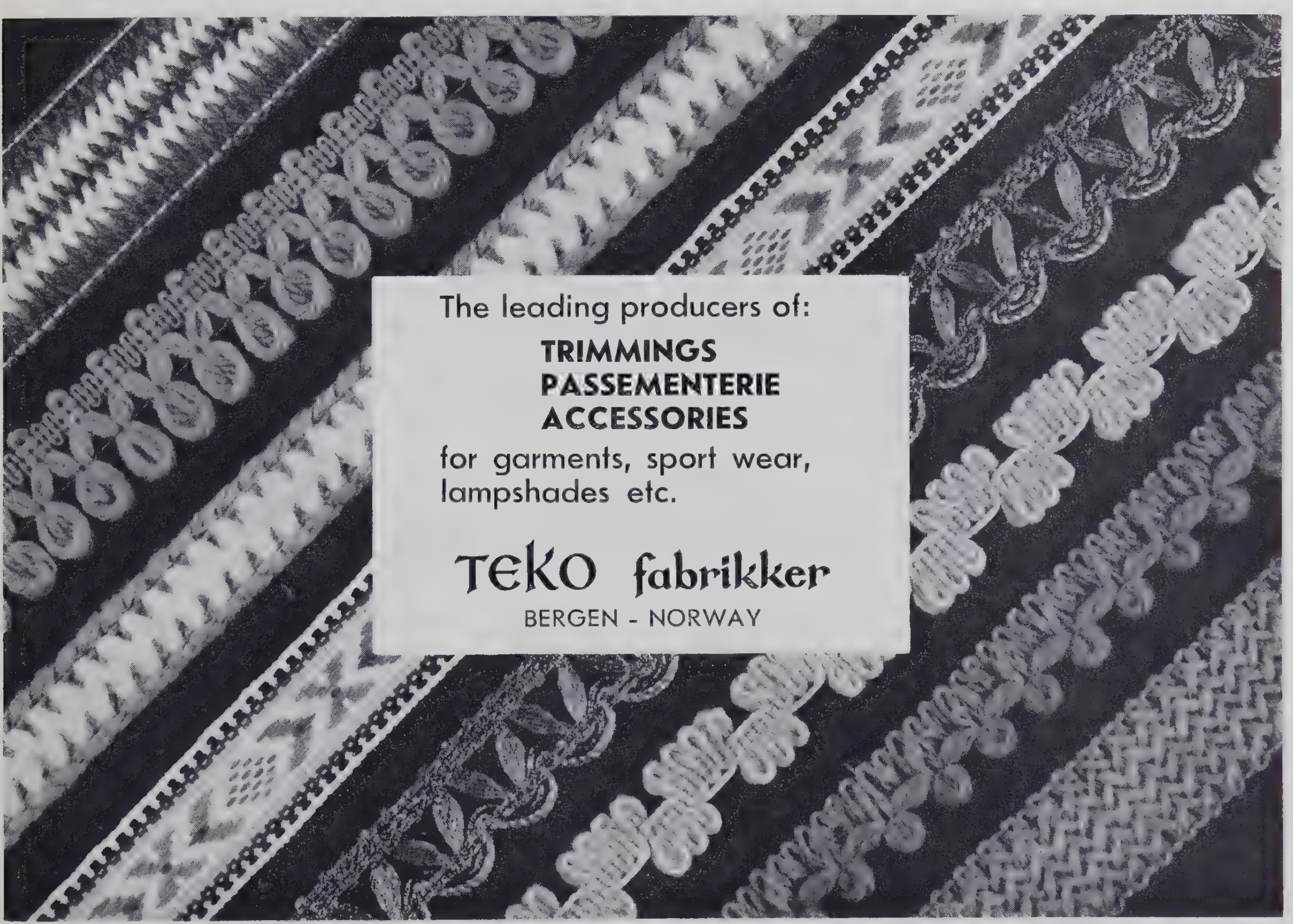

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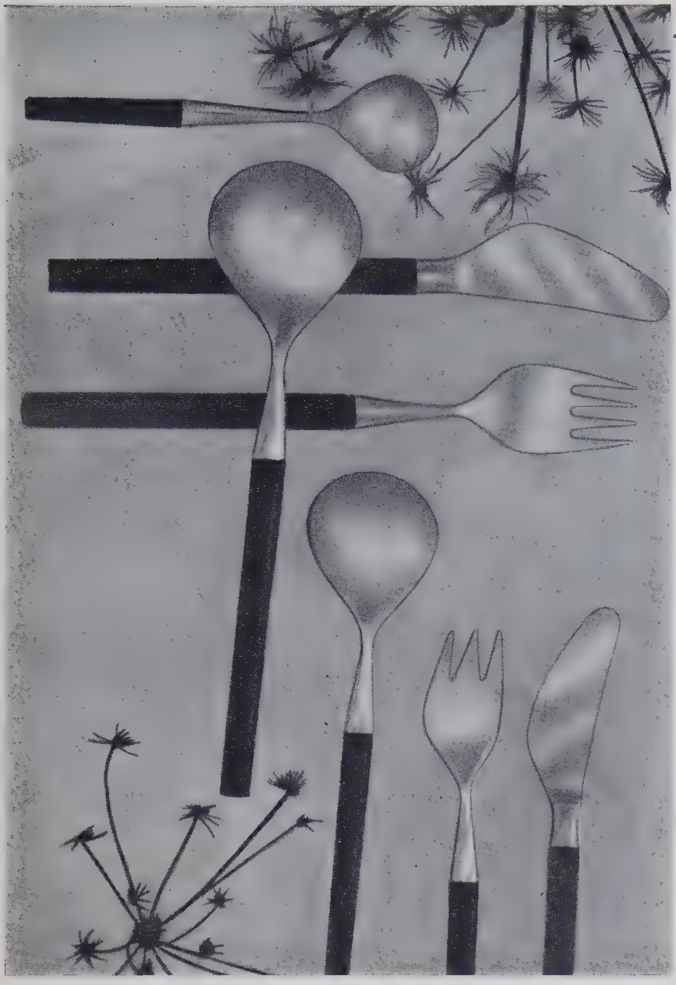

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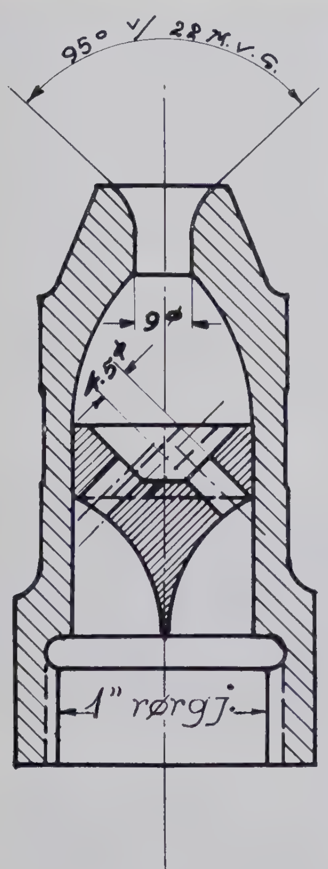
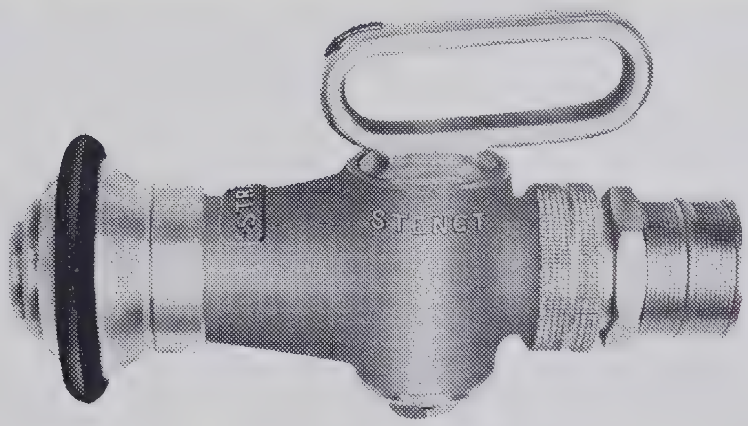


Type D.N.M.F.-4



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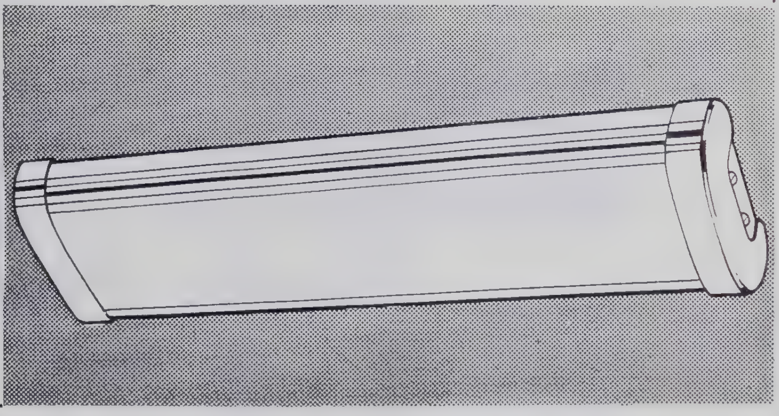

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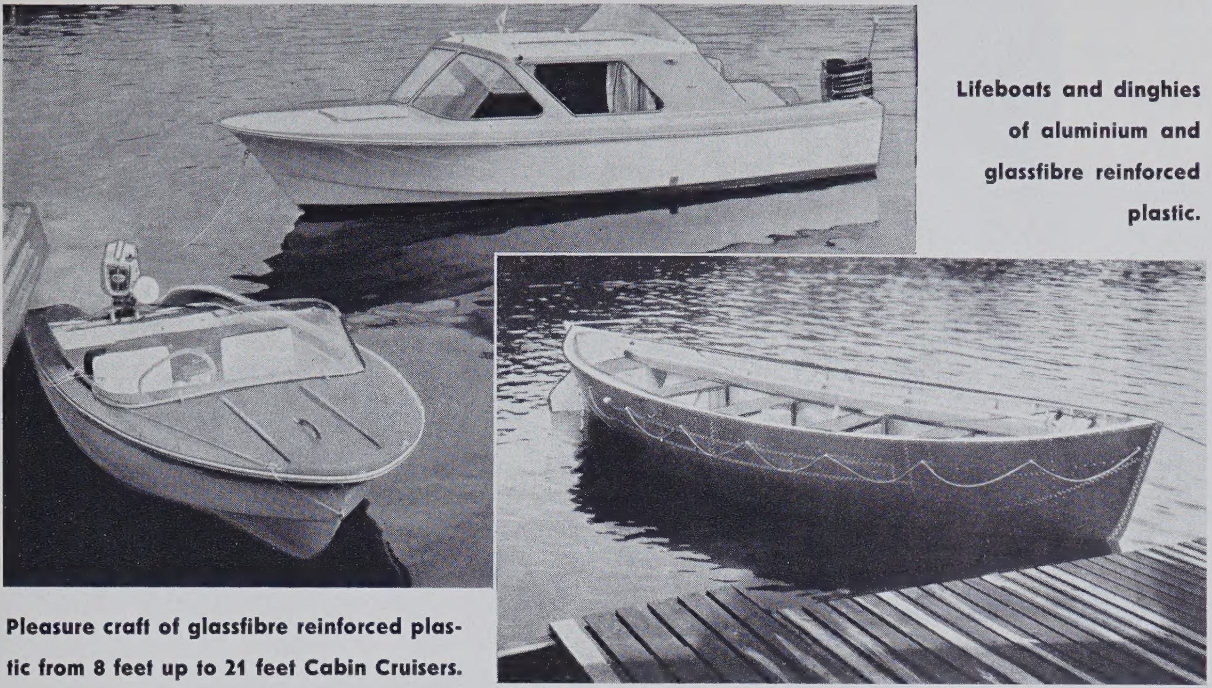

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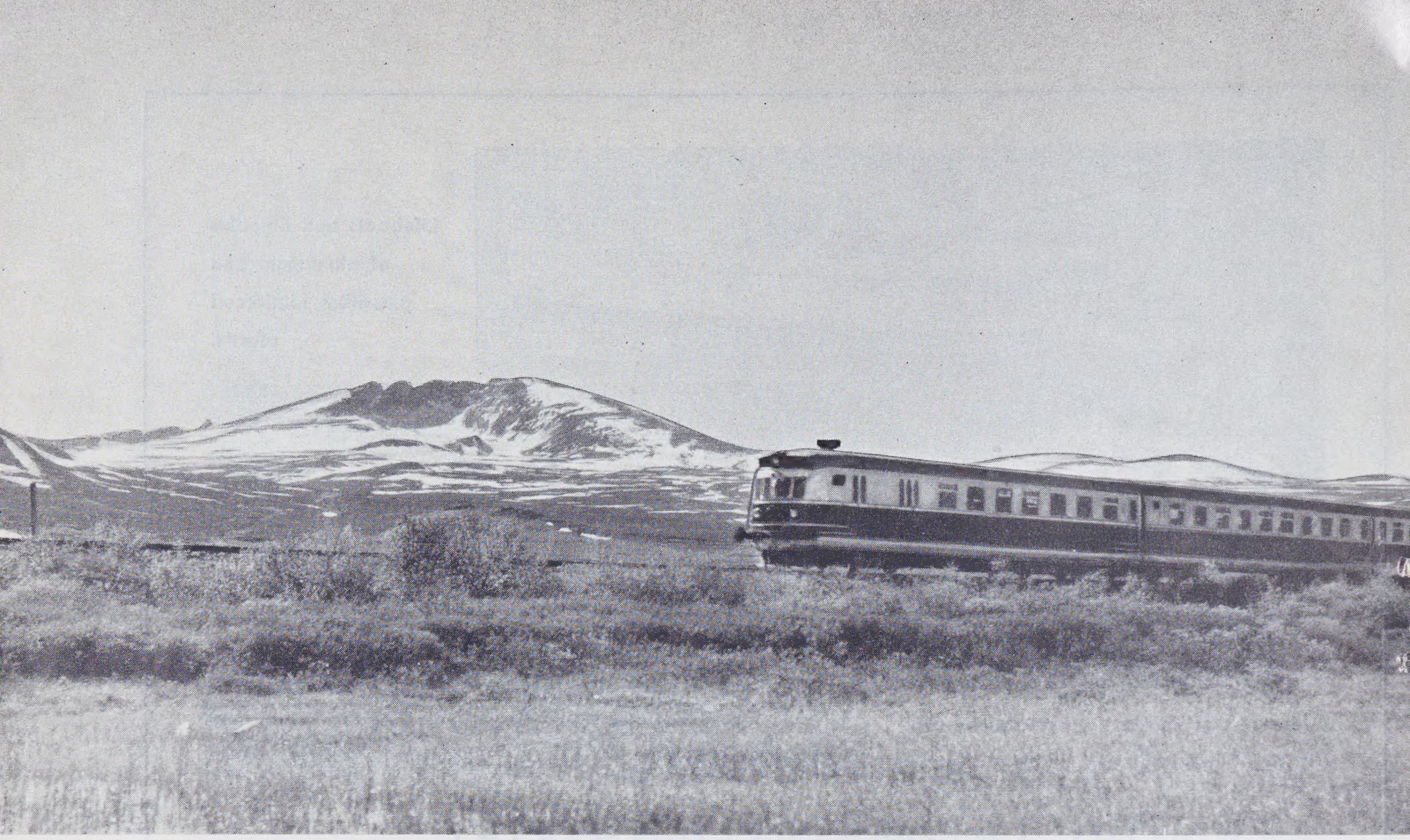

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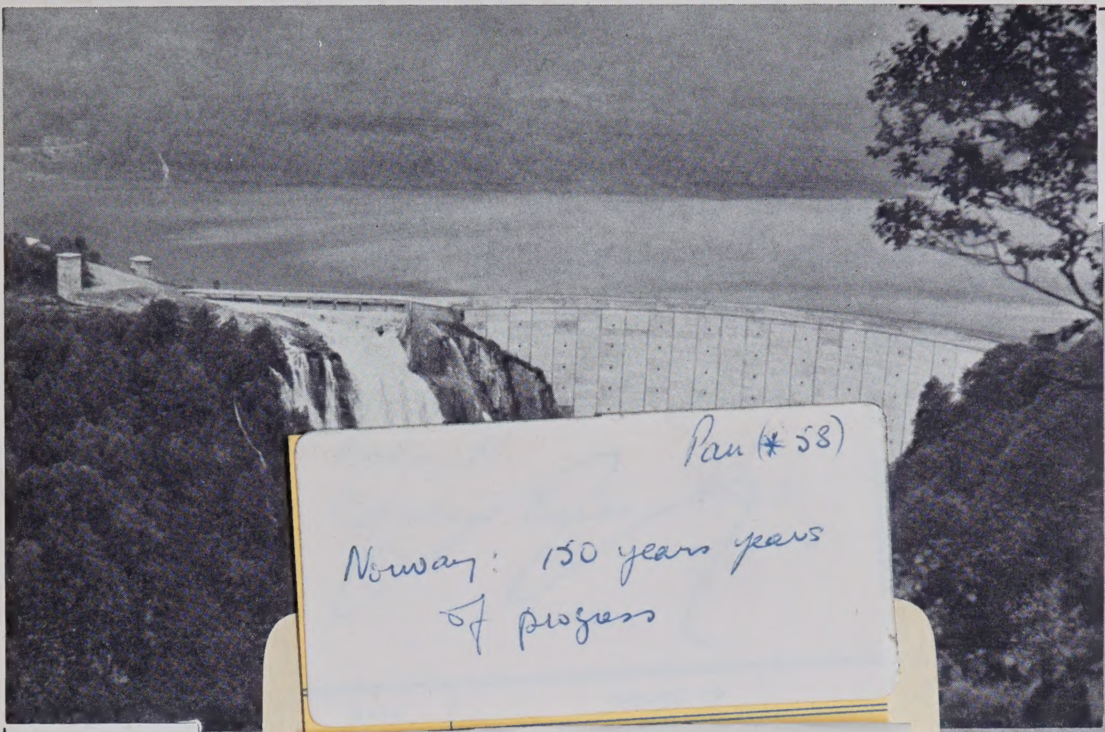

The Slettedalen dam
Design: Cupola arch
Length: 170 m
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BMV
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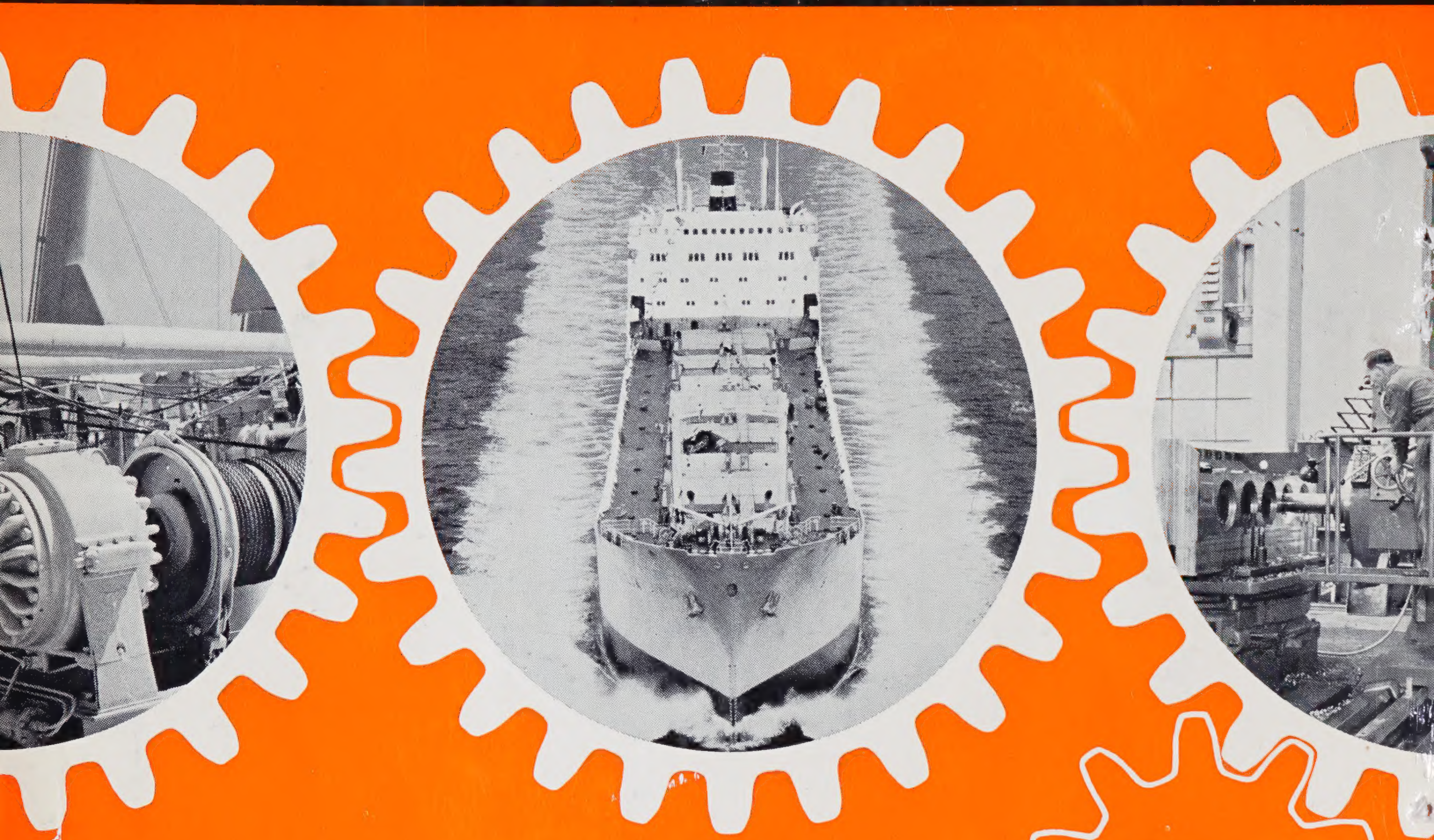
uilding
ships repairs
engine production
winch production



NORMO
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Our Shipbuilding Yard is equipped to build all types of vessels up to 35,000 tons d.w.

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